



THE ASSAM GAZETTE

অসাধাৰণ

EXTRAORDINARY

প্ৰাপ্ত কৰ্তৃত্বৰ দ্বাৰা প্ৰকাশিত

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No. 138 Dispur, Saturday, 4th March, 2023, 13th Phalguna, 1944 (S. E.)

GOVERNMENT OF ASSAM
ORDERS BY THE GOVERNOR
DEPARTMENT OF HOUSING AND URBAN AFFAIRS

NOTIFICATION

The 13th February, 2023

No.ECF.274140/7.- In exercise of the powers conferred by the Section 9 and Sub-section (1) of Section 10 of the Assam Town & Country Planning Act, 1959 (as amended) and (Assam Act II of 1960) read with sub-rule (1) of Rules 3 of the Assam Town & Country Planning (Publication of Master Plan and Zoning Regulations) Rules 1962, the Governor of Assam is pleased to publish the following notice regarding the publication of the Draft Revised Master Plan for Dhemaji.

Notice for publication of the Draft Revised Master Plan for Dhemaji

1. It is notified that the Draft Revised Master Plan for Dhemaji prepared by the Directorate of Town & Country Planning, Government of Assam, under Section 9 of Town & Country Planning Act, 1959 (as amended) read with sub-section 1 of section 10 of Assam Town & Country Planning Act, 1959 (as amended) for the area described in the schedule below is hereby published.
2. Any person or persons affected by the Draft Revised Master Plan may submit their objections or opinions in writing to the Director, Town & Country Planning, Government of Assam, Dispur, Guwahati-6 within two months from the date of publication.
3. The Draft Revised Master Plan for Dhemaji with all relevant papers and maps may be inspected free of cost during the office hours at the office of Director, Town & Country Planning, Dispur, Guwahati-6, the Deputy Director, Town & Country Planning, Dist Office –Dhemaji, office of the Chairman, Dhemaji Municipal Board, Dhemaji, office of the Chairman, Dhemaji Development Authority, Dhemaji and Dhemaji Circle office. Copies of the Draft Revised Master Plan are available at the office of the Deputy Director, Town & Country Planning, Dist Office – Dhemaji for sale on payment.

SCHEDULE OF DHEMAJI MASTER PLAN -

District	:	Dhemaji
Revenue Circle	:	Dhemaji
Master Plan Area	:	142.07 Sq.km (14207 hectare)
Municipal Area	:	18.80 Sq.km (1880 hectare)
Existing Master Plan Area	:	35.00 Sq. Km (3500 hectare)
Sub-Division	:	Dhemaji
Thana	:	Dhemaji

REVENUE AREAS INCLUDED IN THE DRAFT MASTER PLAN FOR DHEMAJI 2041

1. Dhemaji Municipal Area
2. Other Revenue Villages Includes in Planning area:

Nalnipam Konch Gaon	Dighallpathar Gaon	Narabil Gaon Pt II
2 No. Bharali Chuk Pt.I	Dighalmukh Miri Gaon	Panitola Pt II
Hiloidari Block	Tanganapara	Panitola Pt I
Aradhal Gaon	Jamuguri Miri	No.3 Tekjuri
Dihingla Gaon	Bukabil	Jamuguri Sonowal
1 No.Nagakheklia Gaon	No. 1 Bishnupur	Jiadhal Dighal Garah Pt II
Kowafala Habi	No.5 Tekjuri	2 No. Gopak Sonowal
Kowafala	No.1 Tekjuri	1 No. Gopak Sonowal
Kowafala Miri	2 No. Bharali Chuk Pt.II	Jiadhal Dighal Garah Pt I
Telljan Gaon	Telijan Pathar	Jiadhal Miri Pathar
Dushutimuk Miri Pathar	1 No.Kocholting Gaon	Naharbari
Matikhula Gaon	2 No.Kocholting Gaon	Gopak Gaon Pt I
Bongalamari Miri	Nalanipam Gaon	Gopak Gaon Pt II
Bakal Gaon	Hatigarh Gaon	Dihingla Block Pt II
Simalguri Gaon	Traunbill Pt I	Dihingla Block Pt I
Singari Bill	Layengerjan	Jiadhal Dighal Garah Pt III
No.1 Gohain Gaon	Maumari	Jiadhak Tingharia Konch
Pavomari Pathar	Chengell Pathar Gaon Pt I	Kulapathar
Napam Gaon	Hesulipam Block I	Bali Gaon
Dighalimukh Gaon	Panitola Pt III	1No. Nareng Gaon
2 No. Kathal Guri Ghat	No. 5 Tekjuri Pt I	Hachara Pt I

Moridhal Ghat	Jiadhal Bamuni 2	Hachara Pt II
No.1 Khajua	No.1 Raichapori Dolopa	4 No. Raichapori Dolopa
Jamuguri Gaon	Amjuri Jamguri	Gutung Napam Gaon
No. 1 Gohainpam	Gohainbari Chapori	Bebejia Gaon
2 No. Borachira Gaon	Didhali Miripathar	Un-surveyed
3 No. Ghilaghuri Gaon	Choukham Gaon	Map missing (Re-survey)
2 No Ghilaguri	Bam Gaon	Bihdia
No.1 Borachira	Gariajan	Deori Beal Gaon
2No. Joktali Gaon	Gilaguri	
Gutang Gaon	Gowal Gaon	
Sesajan	Rangajan Gaon	
Chengeli Pathar	Majgaon Gaon	
No.4 Tekjuri	Kakati Block Gaon	
No.2 Tekjuri	Joktoli Gaon	
2 No. Nareng Part II	Bor Gaon	
Jamuguri	Nimatichuk Gaon	
4 No. GhilaguriGaon	Nagakhelia Gaon	
2 No. Khajua Gaon	No.2 Raichapori Dolopa Pt I	
Chengeli Pathar Gaon Pt III	No.2 Raichapori Dolopa Pt II	

DESCRIPTION OF THE BOUNDARIES

Listed below are some of the neighbouring villages surrounding the boundary of the Dhemaji planning area.

North : Toganapara Nepali gaon, Shantipar Arya Basti, Lakipathar Morisuti, Han Sona

South : Somara Jan, Boucki Chuk, Halikuchi Ayengia, Batuamukh

East : Bhehjan Block, Kesakani Maj gaon, Kerakani, No. 5 Phuna guri

West : Kecha Kathani, Laukijan N.C., Kamalpur, Somon Jan.

KAVITHA PADMANABHAN,
Commissioner & Secretary to the Government of Assam,
Department of Housing and Urban Affairs,
Dispur, Guwahati-6

INTRODUCTION AND CONTEXT

CHAPTER 1: INTRODUCTION

1.1 Background

Assam is the largest of the north-eastern states with respect to population and the second largest with respect to area. As per Census 2011, the total population of Assam is 31 million, which is around 68 percent of the total population of the north-eastern region. The state is spread over 78,438 sq km, covering about 30 percent of the region's total area. Of all the north-eastern states, Assam is the most densely populated with a population density of 398 persons per sq km which is higher than the national average of 382 persons per sq km. The state is rich in biodiversity and has natural resources in the form of minerals, forests, water and agriculture. In fact, agriculture makes the highest contribution to the domestic sector of Assam, accounting for more than a third of the state Gross Domestic Product (GDP) and employing about 69 percent of its workforce.

Dhemaji is a small and remote town, located towards the eastern parts of Assam and the northern side of the river Brahmaputra. Many large and small rivulets flow in and around the town, making it highly vulnerable to floods. Dhemaji town forms the headquarters of Dhemaji district. But due to the absence of any major industries or commercial units in the area, unemployment is a serious issue in the town, pointing towards the need and scope for economic development.

1.2 Location

Situated near the foothills of the lower Himalayas, Dhemaji town is set amidst the Arunachal hills on the northern side and the river Brahmaputra on the southern side. Lying between 27°25'N and 27°34'N latitudes and 94°28'E and 94°37'E longitudes, the town has an average elevation of 91 m. The national highway NH15 passes through the town connecting it to other cities such as Dibrugarh and Dhemaji. **Figure 1.1** shows major urban centres around Dhemaji town. Dhemaji district is surrounded by the districts of Lakhimpur, Dibrugarh and Tinsukia in the south and East Siang, West Siang and Lower Subansiri in the north. Dibrugarh is one of the prominent cities lying in close proximity of the town and is connected to Dhemaji via Bogibeel Bridge, which is the

longest rail-cum-road bridge in India built across the Brahmaputra River. This bridge was completed in the year 2018 and has proven to be a boon for the people of Dhemaji, enhancing accessibility between Dhemaji and Dibrugarh. The bridge has eased their access to the higher order facilities in Dibrugarh, the third largest city of the north-east. Silapathar and Jonai Bazaar are the other two towns that are located within Dhemaji district. The three towns are connected via NH 515 as well as the north-eastern railway line.

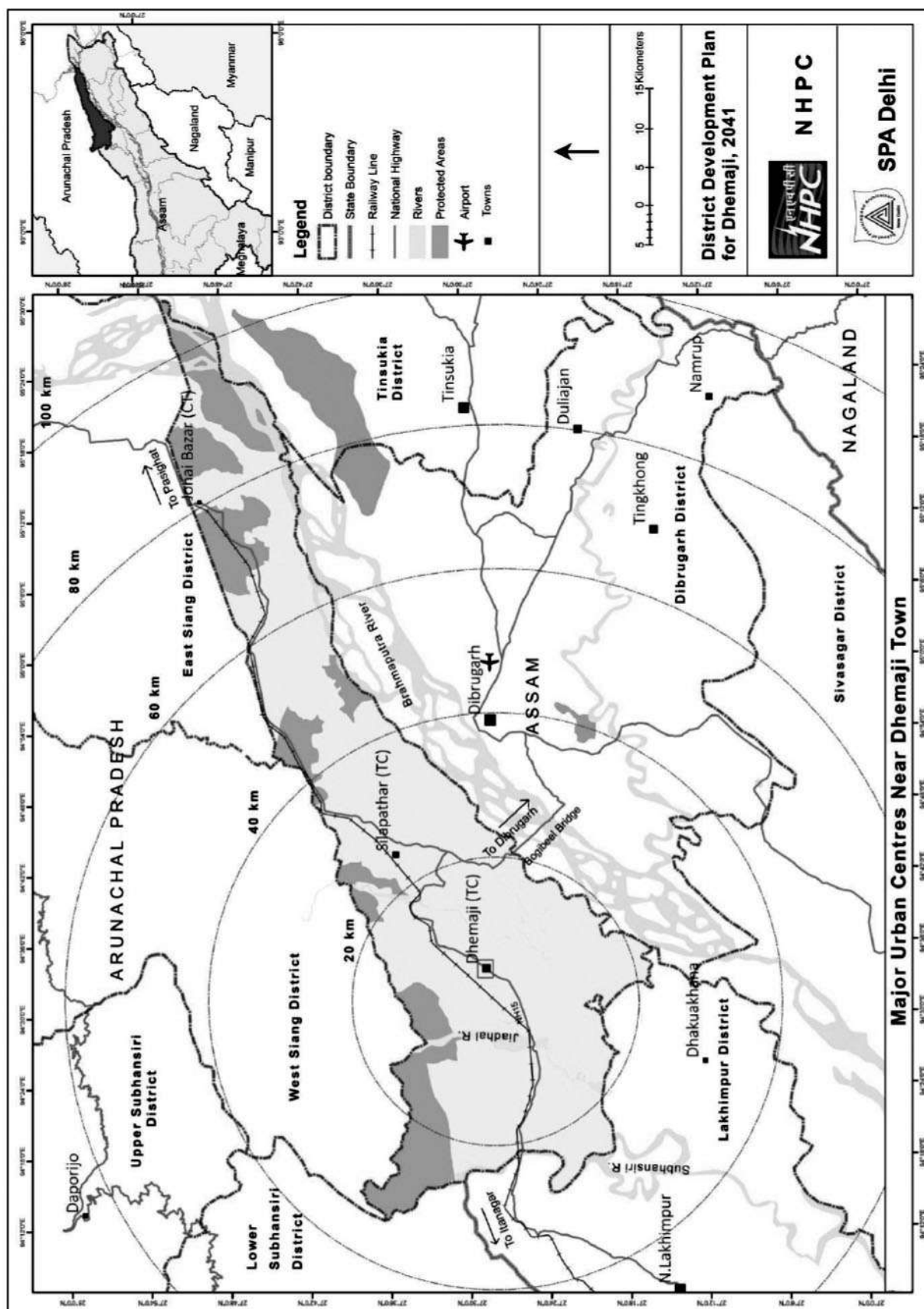
Dhemaji town is located in the vicinity of forests and water bodies and has a rich natural resource base. Jiadhal, a sub-tributary of the river Brahmaputra, flows close to the town. The river Jiadhal originates in Arunachal hills and finally joins Subansiri as shown in the **Figure 1.1**. However, in the last few decades, Jiadhal has been susceptible to frequent floods causing damage to life and property in the nearby villages. During the monsoon months, particularly at the time of high rainfall, the river's channel system fully collapses, and the sediments laden river water flows widely over the floodplains. This often leads to the destruction of crops in the area and has become a cause of concern for the inhabitants and the concerned authorities. Apart from this, several small rivulets such as Telijan, Eradhal, etc. pass through the town. However, over the last few years, these rivulets have turned into *nalas* and water flows through them only during the rainy season.

Jiadhal Reserved Forest, lying towards the north of Dhemaji town, is of the mixed evergreen type and is an abundant resource of bamboo and cane which is an important industry in Dhemaji.

1.3 History of Town

Etymologically, there are different mythological stories regarding the origin of the word 'Dhemaji'. Since ancient times, the place has been home to meandering rivers that changed their course, often resulting in unanticipated floods. The word 'Dhemaji' has been derived from the Assamese words '*Dhal*' and '*Dhemali*' which mean 'flood' and 'playing' respectively. Another belief states that 'Dhemaji' originated from the Bodo¹ word '*Dall Maji*', whereby '*Dall*' means water and '*Maji*' means a broad place.

¹ A minority ethnic group which was among the early settlers of Assam

Figure 1.1: Major Urban Centres near Dhemaji Town, 2021

Source: SPA Delhi (2021).

Historically, around 1240 AD, Chow Chukafa, the first king of Ahom² origin established his capital in Dhemaji. However, due to perennial floods, the capital was shifted and the area then came under the Chutias³. The Chutias ruled over Dhemaji till 1523 AD. Then, the Ahom king, Chuhung Moong, attacked the Chutia Empire and the area again came under the kingdom of Ahoms. Other than Ahoms, Dhemaji has been home to several indigenous tribes including Mising, Sonowal Kachari, Bodo Kachari, Deori and Laloong. There were some tribes that migrated from other areas such as Rabha, Tai - Khamti, Konch, Keot, Koiborta, Brahman, Kayastha, Kalita, etc.

Dhemaji town attained its urban status in 1971, and in 1977, Dhemaji Municipal Board was constituted to investigate all aspects related to the development and maintenance needs of the town.

1.4 Climate

Dhemaji's climate is characterised by high rainfall and mild summers and winters. The annual rainfall of the entire district ranges between 2,600 mm to 3,200 mm. Monsoon usually starts in April and ends in September. July is the rainiest month. On average, there are about 200 rainy days with 3.5 mm or more rain in a year. The relative humidity varies from 73 to 90 percent and the temperature ranges between 39.9°C in summer and 5.9°C in winter. Because of heavy rains, several areas in and around the town remain flooded during the months of June, July and August, disrupting the day to day functioning in both urban and rural areas. Water logging is a serious issue during the monsoon months, particularly within the town.

1.5 Physiography

The entire northeast region is a tectonically active zone due to the presence of active thrusts and fault planes, thereby exposing it to the risk of earthquakes and landslides. Dhemaji falls in the seismic zone 5. The courses of rivers are also affected by these active tectonic lineaments. In Dhemaji district, the steep slope of Eastern Himalayas abruptly drops, forming a narrow valley, which widens towards the western side. Numerous drainage systems originating from the hills of Arunachal Pradesh flow through the district ending at the mighty river Brahmaputra.

² People of the Thai race who settled in Assam

³ An ethnic group that is native to Assam

Dhemaji town and its surrounding villages are located in the flood plain area formed by the tributaries and sub-tributaries of Brahmaputra River. The soil here is alluvial in nature and is composed of a mixture of sand and clay. The general geo-chemical characteristic of the soil is highly acidic. However, new alluvial soils formed by the inundation of land by rivers contain more fine sand and silt and are less acidic. The fertile soil along with the high rainfall and humidity, make the area suitable for the cultivation of rice. The region, however, is susceptible to floods which are regular and often destructive in nature. Apart from rivers, the low-lying alluvial belt has innumerable beels and swamps, creating an ecosystem for various floral and faunal species to flourish.

1.6 Schedule of Dhemaji Planning Area

The schedule of the Master Plan for Dhemaji includes Dhemaji Municipal Area of 18.80 sq.km. and Dhemaji Planning Area of 142.07 sq.km. The details of the schedule of the planning area are as follows:

District: Dhemaji, Assam

Sub-division: Dhemaji, Assam

Municipal Area: 18.80 sq.km.

Planning Area: 142.07 sq.km

1.7 Description of the Boundaries

Listed below are some of the neighbouring villages surrounding the boundary of the Dhemaji planning area.

North: Tonganapara Nepali gaom, Shantipar Arya Basti, Lakipathar Morisuti, Han Sona

South: Somara Jan, Boucki Chuk, Halikuchi Ayengia, Batuamukh

East: Bhehjan Block, Kesakani Maj gaon, Kerakani, No. 5 Phuna guri

West: Kecha Kathani, Laukijan N.C., Kamalpur, Somon Jan

A contour map has also been generated at an interval of three meters for the entire planning area. Based on this, levels of all the major roads have been calculated from the mean sea level. The zero point of Dhemaji town has been pinned at the railway station as shown in Figure 1.3.

Legend

- Planning boundary
- Municipal boundary
- Village boundary
- Ward boundary
- Dag boundary
- Existing Road Network
 - Arterial
 - Sub Arterial
 - Collector
 - Local
 - Railway Line
 - Water bodies
 - Rivers

Scale

0 1.5 3 Km

Dhemaji Master Plan, 2041

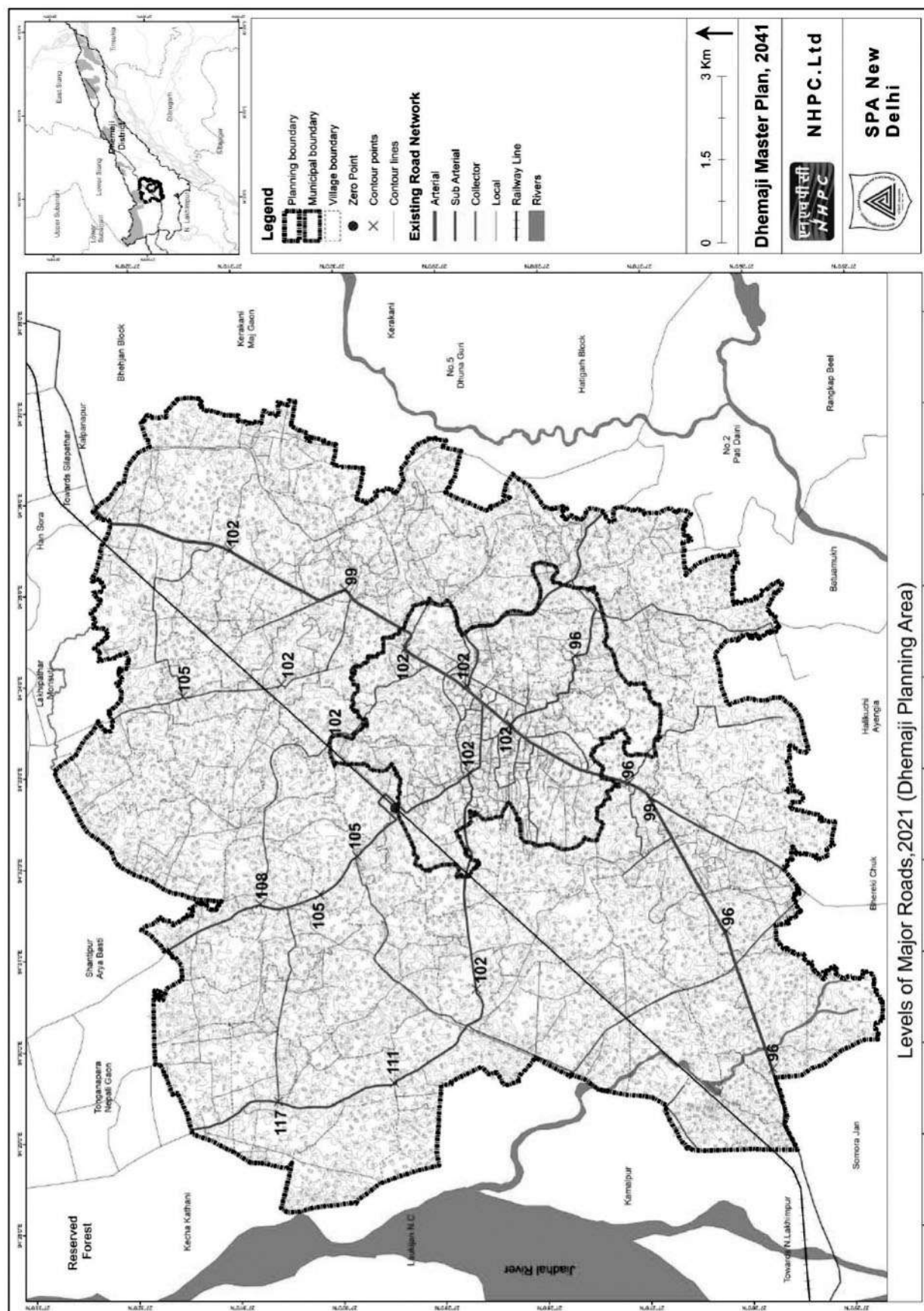
NHPC.Ltd

SPA New Delhi

Base Map of Dhemaji Planning Area, 2021

Source: SPA New Delhi (2021)

Figure 1.3: Road Levels of Major Roads in Dhemaji, 2021



Source: SPA New Delhi (2021)

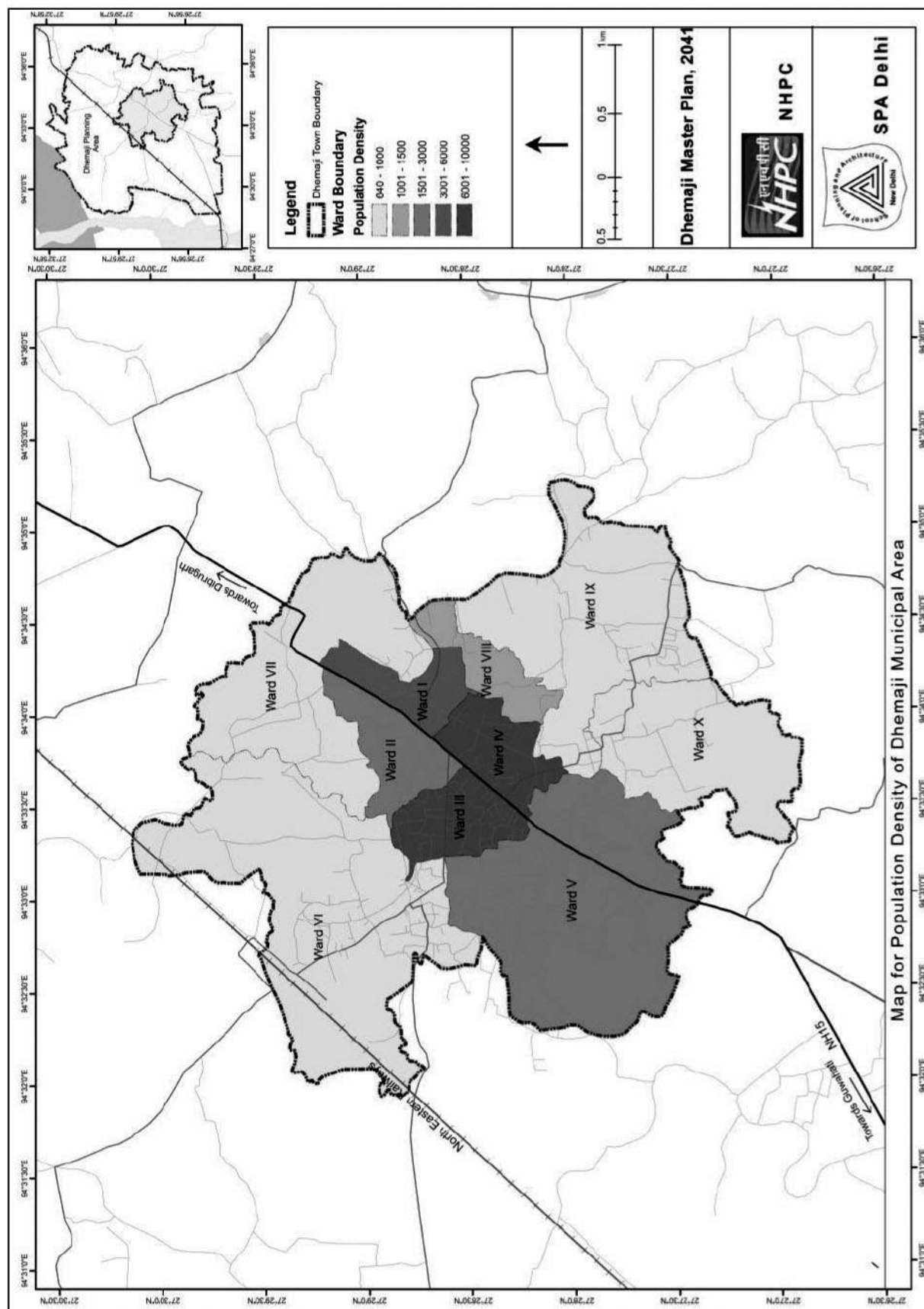
1.8 Expansion of Dhemaji Municipal Area

Till the year 2013, Dhemaji town comprised of four wards, covering an area of 3.5 sq km. However, in the year 2016, six more wards were added to the Dhemaji Municipal Area, thereby increasing the total number of wards to ten and the total town area to 18.80 sq km. In Figure 1.4, wards 1, 2, 3 and 4 form the core area of the town and wards 5, 6, 7, 8, 9 and 10 are the newly added wards. The population density is higher in the core wards which contain most of the residential and commercial areas as compared to the outer wards. **Table 1.1** depicts the ward-wise population density for Dhemaji Municipal Area.

Table 1.1: Ward-wise Population Density of Dhemaji Municipal Area, 2011

Ward Number	Population	Area (sq. km.)	Population Density (persons per sq. km.)
1.	2052	0.57	3600
2.	1505	0.70	2150
3.	5977	0.71	8418
4.	3927	0.65	6041
5.	5953	3.57	1667
6.	4229	4.53	933
7.	1736	2.50	690
8.	778	0.53	1467
9.	2601	3.04	855
10.	1173	1.94	604
Total	29931	18.80	1592.07

Source: Dhemaji Municipal Board, 2021

Figure 1.4: Ward Wise Population Density for Dhemaji Municipal Area, 2016

Source: Department of Town and Country Planning, Dhemaji (2021).

1.9 Earlier Planning Efforts

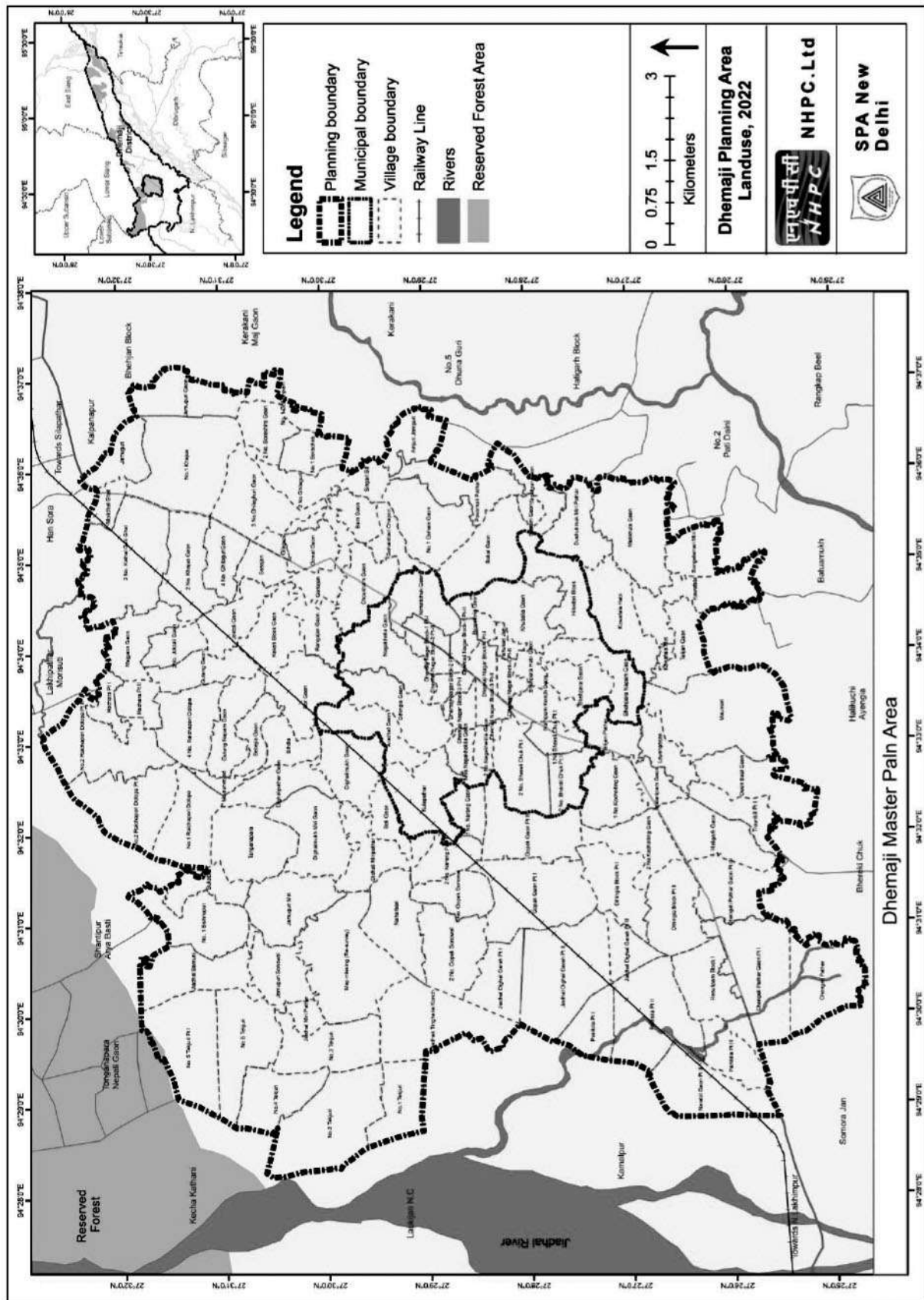
As stated in section 1.3, Dhemaji town was constituted in the year 1971 and later, in 1977, Dhemaji Municipal Board was formed. The then Municipal Area had a total of 4 wards. In 2007, the Dhemaji Master Plan was published under Section 10 of the Assam Town and Country Planning Act 1959, and the Assam Town and Country Planning (amended) Act 1994, with the perspective year of 2025. The plan focussed on the development of balanced and integrated urban structure with judicious utilization of land.

Dhemaji Master Plan, 2041 has been prepared with the vision to achieve socio-economic development in the planning area by the provision of basic services and utilities in terms of infrastructure sustainability.

1.10 Dhemaji Planning Area

The delineation of the planning area is one of the most crucial aspects for the preparation of a master plan. For Dhemaji, a total of 101 villages, apart from the Municipal Area, have been included in the master plan covering a total area of around 142.07 sq km. **Figure 1.5** shows the delineated Dhemaji Planning Area and the prominent landmarks that are likely to promote future growth. The main factors considered have been explained below.

- (a) Apart from the Municipal area, villages where a significant number of building permissions have been granted in the last few years have been included in the planning area.
- (b) Availability of infrastructure is a major factor for densifying an area. Educational facilities such as Dhemaji Engineering College, Moridhal College and Dhemaji Town College, located in the outskirts of the town, attract many students, thereby showcasing potential for accelerating development.
- (c) Nature Pure's bottled water factory in Hatigarh is the only large-scale industrial unit located in the vicinity of Dhemaji town. Because of the employment opportunities generated, such industries play a pivotal role in promoting development.
- (d) Dhemaji Medical College is proposed to come up in Kowafala Habi for which 93 acres of land has been identified. This would further escalate the development in the area by establishing a strong base for healthcare services.

Figure 1.5: Dhemaji Planning Area-2041

Source: Department of Town and Country Planning, Dhemaji (2021).

1.11 Data Sources

Although Census 2011 has been taken as a key source to analyse socio-economic characteristics of the Planning Area, to get a better understanding of the present-day scenario, primary surveys were conducted by the SPA Delhi team as a part of the field visit from 18 October 2021 to 1 November 2021. This included household surveys, commercial surveys, transportation surveys and land use surveys. So, apart from the Census data, data from these surveys would be used to gather inferences related to demography, housing, economy, transport and infrastructure at the town level. It is to be noted that since primary surveys were conducted in the town, the survey findings would be limited to the municipal area only. Area beyond municipal limits is largely used for agricultural activities. Apart from this, secondary data was collected from the respective departments. This section gives a brief description of the data collected for the preparation of Dhemaji Master Plan, 2041, from primary and secondary sources.

1.11.1 Primary Sources

Primary data sources are those in which the data is collected first-hand by the researchers and surveyors for a specific purpose or project. For the preparation of Dhemaji Master Plan, primary data was collected through household surveys, commercial surveys, transportation surveys and land use surveys.

1.11.1.1 Household Surveys

Household surveys aim to collect comprehensive and diverse socio-demographic data pertaining to conditions under which people live, their welfare, demographic characteristics, and cultural factors, that influence behaviour as well as social and economic change. In Dhemaji Municipal Area, household surveys were conducted to understand the basic needs and challenges faced by the residents. A sample size of 300 households which is around 4.5 percent of the total number of households in the town, was undertaken. For this, 30 households were selected randomly from each of the 10 wards. The survey questionnaire has been enclosed in **Annexure I**.

1.11.1.2 Commercial Surveys

Commercial surveys were conducted in the main market areas of the town, that is, Tiniali, Cheriali and Station Road to understand the market conditions with respect to infrastructure, customer reach, goods' import, ownership, etc. Both sellers (15) as well

buyers (10) were interviewed for these surveys to get a better understanding of market-related issues in the area.

1.11.1.3 Transportation Surveys

To analyse the current challenges with respect to traffic and transportation in the town, the following surveys were conducted.

- Road Inventory Survey to identify the major roads in the town and evaluate road-characteristics such as right of way, carriage width, drainage, footpath, etc.
- Traffic Volume Count to find the peak hour traffic on major roads and assess their level of service.
- Parking Survey to check whether parking accumulation on main roads exceeds the existing capacity.

1.11.1.4 Land Use Survey

Detailed land use survey was carried out for the entire municipal area to identify the residential, commercial, institutional and industrial pockets in the town along with the major landmarks including educational, healthcare, recreational, public and semi-public facilities. The municipal area was zoned before conducting land use surveys. The survey would aid the preparation of an existing land use map.

1.11.2 Secondary Sources

Secondary data includes data that is collected from the existing sources, collected by other organizations and individuals for their needs and specific purposes. For this report, secondary data has been collected from the Census of India and the official records and reports from Assam Government's departments, including the Dhemaji Municipal Board, Town and Country Planning Department, Dhemaji Development Authority and the respective government offices looking after areas such as agriculture, sericulture, handloom and textiles, industries, housing, transport, environment and forests, disaster management, employment, etc.

The Census of India 2011 records depict that the Dhemaji Municipal Area has a total of four wards. However, since 2016, the Dhemaji Municipal Area has 10 wards. So, the additional six wards have been formed by merging certain villages as shown in **Table**

1.2. This rural to urban conversion has been considered while assessing the Census data.

Table 1.2: Villages Added to the Dhemaji Municipal Area, 2016

Ward Number	Name of Villages
Ward 5	Nalanipam Koch Gaon, Bharali Chuk Gaon, 1 No. Nagakhelia Block, 2 No. Bharali Chuk Gaon Pt I, 2 No. Bharali Chuk Gaon Pt II
Ward 6	2 No. Nagakhelia Block, Kulapothar Gaon, Aradhal Gaon, Dihingia Gaon
Ward 7	Nimati Chuk Gaon, Nagakhelia Gaon
Ward 8	Barpatoria Gaon, Pahukari Jan
Ward 9	Bhehpara Habi, Khubalia Gaon, Hiloidari Block Gaon
Ward 10	Bhehpara Napam Gaon, Bhehpara Gaon

Source: Town and Country Planning Department, Dhemaji (2021).

ANALYSIS OF SECTORS

CHAPTER 2: DEMOGRAPHY

2.1 Introduction

Population analysis is crucial to the preparation of a master plan and is a useful means for analysing and predicting social, cultural and economic trends by examining size, structure and movement of people. Since urban areas are not homogenous in nature, demographic data gives a picture of the characteristics and composition of a city's population which is a significant differentiating factor at the urban level.

We begin by analysing demographic structure of the city by understanding growth trends of the population as well as its spatial distribution along with population density, literacy, sex ratio, workforce, etc.

2.2 Population Growth

Population growth, in general, is a measure of the increase in the number of people in an area over a given period of time. As per Census of India, the population of Dhemaji town was 8,891 in 1991, 11,863 in 2001 and 12,816 in 2011. However, the total population of Dhemaji Planning Area was 44,517 in 1991, 67,727 in 2001 and 77,791 in 2011.

Table 2.1 shows the urban and rural population of Dhemaji Planning Area in the aforementioned years. First, percent share of rural population has gone up from 81.93 percent in 1991 to 83.82 percent in 2011 and percent share of urban population has gone down from 18.07 percent in 1991 to 16.18 percent in 2011. This is so because the area included in the planning area is predominantly rural in nature and so the share of rural population has increased over time. **Table 2.1** also reveals that the growth rate between 1991 and 2001 was 37.67 percent and that between 2001 and 2011 was 16.88 percent, a decline of more than half. So, the growth rate has decreased drastically for 2011. The main reason behind this has been the out-migration of youth due to lack of adequate employment opportunities in the area. Since no major industries or commercial establishments are situated in and around Dhemaji town, even the educated youth find it hard to get well-paid jobs. Hence, they are forced to move out to places like Bengaluru, Thiruvananthapuram, Kolkata, etc. where they can find work easily in large-

scale industries. Error! Reference source not found. shows growth trends of population for 1991, 2001 and 2011.

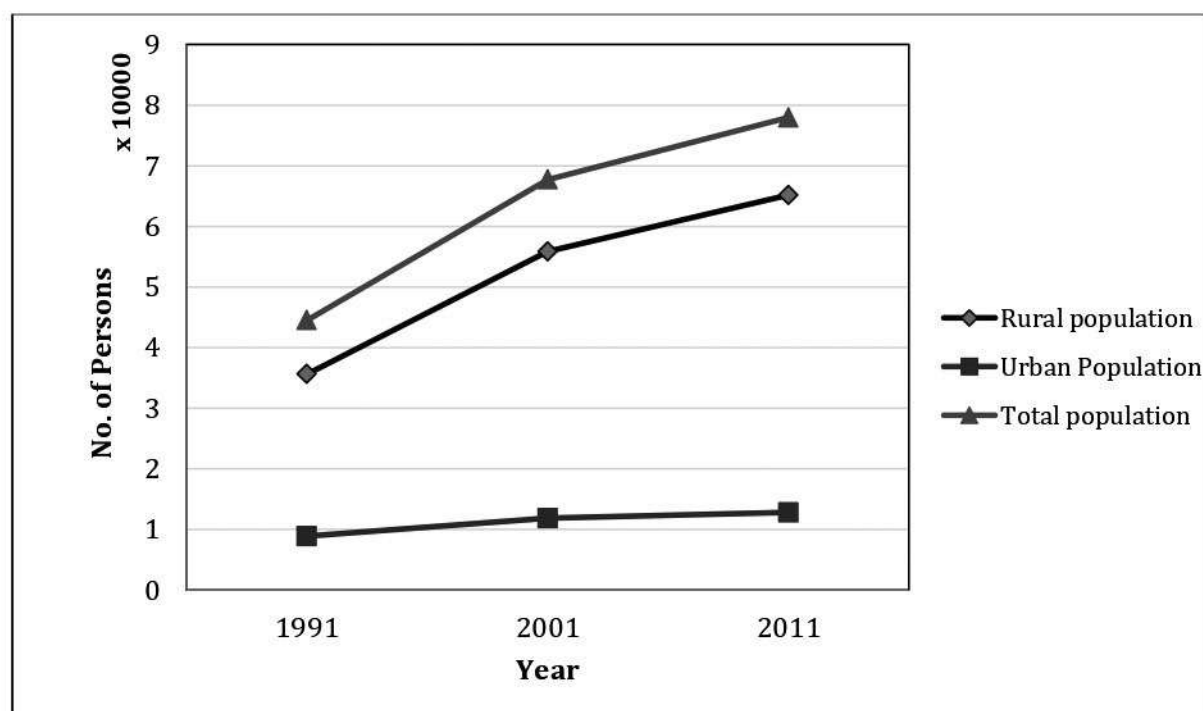
Table 2.1 Rural and Urban Population of Dhemaji Planning Area from 1991 to 2011

Year	Population					Total	Growth Rate
	Rural		Urban*				
	Number	Percentage	Number	Percentage			
1991	40,329	81.93	8,891	18.07	49,220		
2001	55,864	82.48	11,863	17.52	67,727	37.67	
2011	64,975	83.52	12,816	16.48	77,791	16.88	

Note. * Urban population till the year 2011 is indicative of the population of Ward 1, Ward 2, Ward 3 and Ward 4 only, i.e., the wards included in the then Municipal Area. The other six wards which were added to the Municipal Area in the year 2016 have been included in the rural population.

Source: Census of India (2011).

Figure 2.1: Population Growth in Dhemaji Planning Area, 2011



Source: Census of India (2011).

As mentioned in section 1.8, at present, Dhemaji Municipal Area has a total of ten wards. Therefore, the urban population of Dhemaji Planning Area, as per Census 2011, would be 29,931 with a geographical area of 18.80 sq km. **Table 2.2** shows the demography details of Dhemaji Municipal Area, after the expansion of the town in 2016, with respect to the number of males, females and SC-ST population.

Table 2.2: Demography Details of Dhemaji Town, 2016

No. of Wards	Area (sq km)	Population	Total Males	Total Females	SC		ST	
					Males	Females	Males	Females
10	18.80	29,931	17,900	12,031	1,210	746	5,710	3,838

Source: Dhemaji Municipal Board (2016).

2.3 Sex Ratio

Sex ratio is used to describe the number of females per thousand males in an area. Within Dhemaji Planning Area, as per Census 2011, the male population in rural areas has increased from 18,406 in 1991 to 33,513 in 2011 while the female population living in rural areas has increased from 17,220 in 1991 to 32,094 in 2011 as shown in **Table 2.3**. For urban area, that is, the Dhemaji Municipal Area, the male population has increased from 5,178 in 1991 to 6,514 in 2011 and the female population has increased from 3,713 in 1991 to 6,302 in 2011. Growth rate for both male and female population has decreased drastically between 2001-11 in comparison to the previous decade. This is particularly noticeable for the urban male population, for which the growth rate has come down from 23.14 percent in 2001 to 2.16 percent in 2011. This can be attributed to the out-migration of youth due to lack of employment opportunities in the area.

Table 2.3: Male and Female Population in Dhemaji Planning Area from 1991 to 2011

Year	Male Population				Female Population			
	Rural	Growth Rate (Percent)	Urban	Growth Rate (Percent)	Rural	G.R.	Urban	Growth Rate (Percent)
1991	18,406	-	5,178	-	17,220	-	3,713	-
2001	28,607	55.42	6,376	23.14	27,257	58.29	5,487	47.78
2011	33,513	17.15	6,514	2.16	32,094	17.74	6,302	14.85

Source: Census of India (2011).

Overall, the sex ratio for both rural and urban areas has improved over the years. For 2011, the sex ratio in rural areas stands at 958 while that in the urban area is 967. This is higher than the overall sex ratio in Dhemaji district, which is, 955 and 934 in rural and urban areas, respectively. For the Planning Area, sex ratio has improved from 887 in 1991 to 959 in 2011 as shown in Table 2.4.

Table 2.4: Sex Ratio in Dhemaji Planning Area from 1991 to 2011

Year	Sex Ratio		
	Rural	Urban	Planning Area
1991	935	717	887
2001	953	861	936
2011	958	967	959

Source: Census of India (2011).

2.4 Literacy

According to the Census of India, a person aged seven and above, who can both read and write with understanding in any language, is treated as literate. Accordingly, the literacy rate is worked out by excluding the sub-population in the age group of 0 to 6 years from the total population.

Table 2.5 shows that the male literacy rate increased from 85.80 percent in 1991 to 94.28 percent in 2011 in the urban area, and from 69.6 percent in 1991 to 89.09 percent in 2011 in rural areas. Female literacy rate, on the other hand, increased from 72.52 percent in 1991 to 88.65 percent in 2011 in the urban area and from 46.67 percent in 1991 to 78.51 percent in 2011 in the rural areas, demonstrating a significant improvement in the education status of female. Overall, the literacy rate in rural areas has risen from 52.24 percent in 1991 to 84.6 percent in 2011, which is quite close to the corresponding value for the urban area, that is, 91.51 percent. Total literacy rate for Dhemaji Planning Area is 85.76 percent in 2011, which is higher than the literacy rate of Dhemaji district, that is, 72.7 percent. In fact, the literacy rate of the rural areas is also higher than the district average.

Table 2.5 Literacy Rate for Dhemaji Planning Area, 1991 and 2011

Year	Male Literacy Rate (percent)		Female Literacy Rate (percent)		Total Literacy Rate (percent)		
	Rural	Urban	Rural	Urban	Rural	Urban	Total
1991	69.60	85.80	46.67	72.52	52.24	80.44	63.19
2001	85.26	90.64	66.89	80.84	76.35	86.16	78.10
2011	89.09	94.28	78.51	88.65	84.60	91.52	85.76

Source: Census of India (2011).

2.5 Workforce Participation

According to the Census of India, a worker is defined as any person engaged in an economically productive activity with or without compensation, wages or profit. The workforce participation rate is the population that is either working or actively looking for work. The reference period for determining a person as a worker is one year preceding the date of census enumeration. **Table 2.6** provides an analysis related to workforce participation for Dhemaji Planning Area from 1991 to 2011.

Table 2.6: Workforce Participation for Dhemaji Planning Area from 1991 to 2011

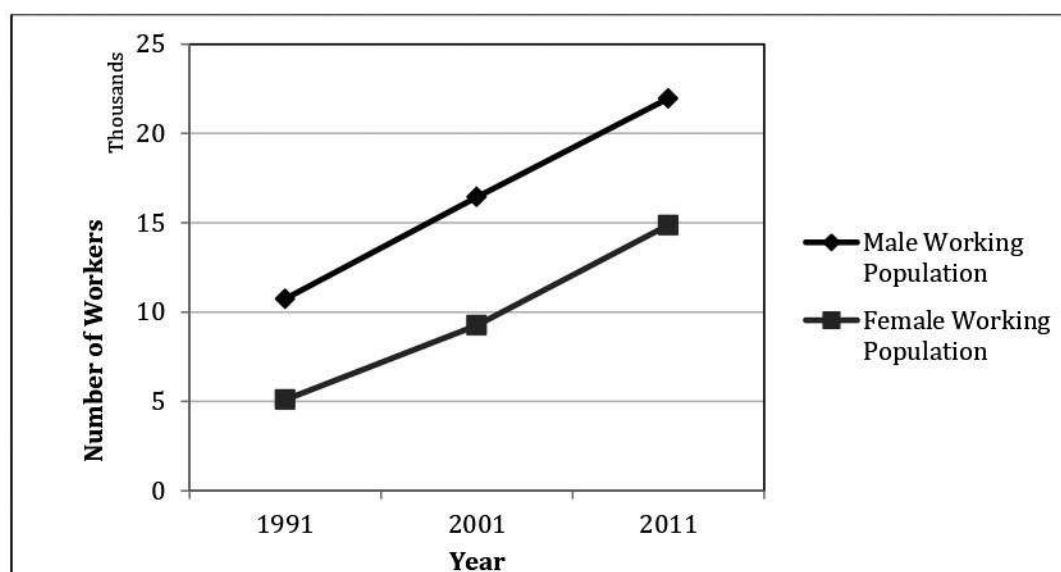
Year	Male Working Population (percent)		Female Working Population (percent)		Total Working Population (percent)		Workforce Participation Rate (percent)
	Rural	Urban	Rural	Urban	Rural	Urban	
1991	43.61	52.39	25.21	20.33	34.71	39.01	35.57
2001	46.19	50.59	31.12	14.14	38.84	33.73	37.94
2011	54.55	56.43	42.01	22.05	48.76	39.53	46.24

Source: Census of India (2011).

From 1991 to 2001, the female working population has increased from 25.21 percent to 42.01 percent in the rural areas and from 2001 to 2011, it has grown from 14.14 percent in 1991 to 22.05 percent in the urban area. This is relatively higher than the proportional change in the male working population for these years which is indicative of the engagement of female in economic work, such as household level handloom industries, in both rural and urban areas.

Figure 2.2 shows that in the Dhemaji Planning Area, the male working population has almost doubled and the female working population has increased by three times from 1991 to 2011.

Figure 2.2 Male and Female Working Population in Dhemaji Planning Area from 1991 to 2011



Source: Census of India (2011).

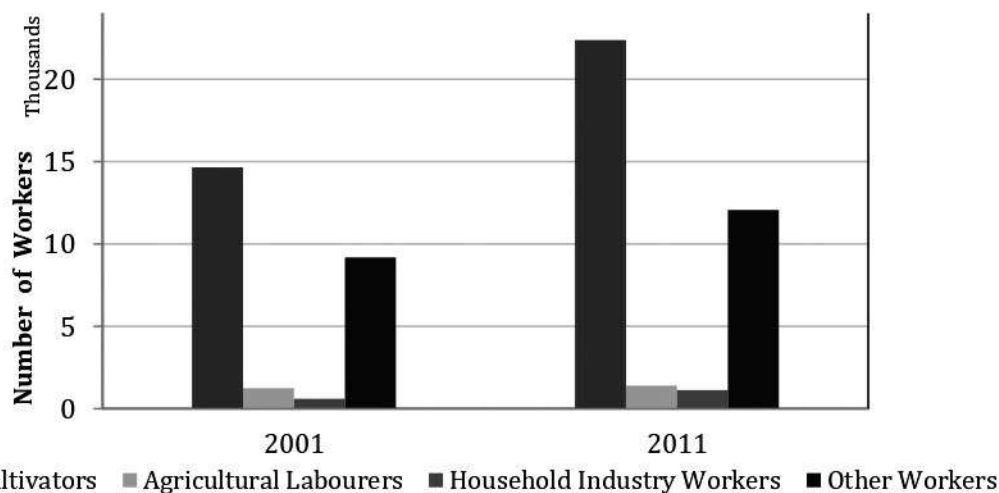
According to the Census of India, based on the type of work, workers are further classified as cultivators, agricultural labourers, household industry workers and other workers. Cultivators are engaged in the cultivation of land either owned or held from government or private persons or institutions. An agricultural labourer, on the other hand, works on another person's land for wages. Similarly, household industry workers are those engaged in an industry conducted by one or more members of the household, mostly within the precincts of the house where the household lives. All other workers who cannot be classified as cultivators, agricultural labourers or household industry workers, fall in the category of 'other workers'.

The category-wise bifurcation of the working population in Dhemaji Planning Area is shown in **Table 2.7** and **Figure 2.3**. It is noteworthy that maximum number of workers are cultivators, followed by workers engaged in the service sector, that is, other workers. Though the percentage of cultivators has increased in both rural and urban areas from 2001-11, the percentage of agricultural labourers has declined. Also, the number of household industry workers has almost doubled from 2001 to 2011 which is indicative of the development of household-level handloom industries in the area. In fact, in the urban area,

Table 2.7: Category-wise Number of Workers in Dhemaji Planning Area in 2001 and 2011

Type of Workers (Percent)		2001	2011
Cultivators	Rural	56.56	58.83
	Urban	0.45	1.64
Agricultural Labourers	Rural	4.78	3.66
	Urban	0.09	1.46
Household Industry Workers	Rural	1.83	2.13
	Urban	0.56	9.49
Other Workers	Rural	21.25	21.31
	Urban	14.47	11.34

Source: Census of India (2011).

Figure 2.3: Types of Workers in Dhemaji Planning Area in 2001 and 2011

Source: Census of India (2011).

2.6 Population Density

Population density is a measure of the population per unit area. **Table 2.8** examines urban and rural population density in the Planning Area. For the year 2011, the average population density in rural areas falling within the Planning Area of Dhemaji is 4.88 persons per hectare (pph) and that for the urban area is 36.62 pph, which is indicative of the sharp difference between urban and rural population densities. The population

density for Dhemaji Planning Area for the year 2011 is 5.69 persons per hectare which is higher than the population density of Dhemaji district, i.e., 2.13 persons per hectare.

Table 2.8: Population Density of Dhemaji Planning Area from 1991 to 2011

Year	Population Density (persons per hectare)		
	Municipal Area (largely urban)	Rest of the Planning Area (largely rural)	Planning Area
1991	25.40	2.67	3.25
2001	33.89	4.18	4.94
2011	36.62	4.88	5.69

Note. * Urban area till the year 2011 is indicative of Ward 1, Ward 2, Ward 3 and Ward 4 only, i.e., the wards included in the then Municipal Area. The other six wards were added to the Municipal Area in the year 2016 and form a part of the rural area here.

Source: Census of India (2011).

2.7 Conclusions

Decadal population growth rate of Dhemaji Planning Area has decreased significantly from 37.67 percent in 2001 to 16.18 percent in 2011 which is indicative of the massive out-migration caused due to lack of employment opportunities in this area. Unemployment is a major issue in Dhemaji which can be solved by further promoting and developing industrial and commercial establishments in the region.

Sex ratio in Dhemaji has improved, particularly in the urban area, from 717 in 1991 to 967 in 2011, which is reflective of an increase in the number of female births; a positive societal change. Literacy rate has also gone up from 63.19 percent in 1991 to 85.76 percent in 2011. In fact, percent increase for female literacy rate has been much more than that for male literacy rate in both urban and rural areas.

Workforce participation has also shown a positive trend, particularly from 2001 to 2011, whereby the workforce participation rate increased from 37.94 percent to 46.24 percent. As per Census of India 2011, more than 55 percent of the workers are cultivators which implies that most of the workers in the area are engaged in primary activities. Percent of cultivators has also increased from 2001 to 2011, indicating deepening trend towards agrarian nature of the economy.

CHAPTER 3: ECONOMY

3.1 Introduction

The economy of a city or town comprises of different sectors. Although each sector has a specific role to play, the production and production processes are often interrelated and interdependent. For instance, the agricultural produce from the fields is used as a raw material in industries and the manufactured products from industries are further sold at retail stores. So, higher is the demand for a manufactured product, more would be the demand for its raw materials or the agricultural produce. Hence, development and regulation of these sectors can have a significant impact on employment generation and financial progress within the city.

Sectors in the economy can be classified into three categories: primary, secondary and tertiary. Primary activities are those which involve the production of raw materials; secondary activities involve the transformation of raw materials into finished goods; and tertiary activities revolve around the supply of services to consumers. Based on this, the economic profile of a city shall cover agriculture and allied activities (primary sector), industries (secondary sector) and trade and commerce (tertiary sector).

3.2 Agriculture and Allied Activities

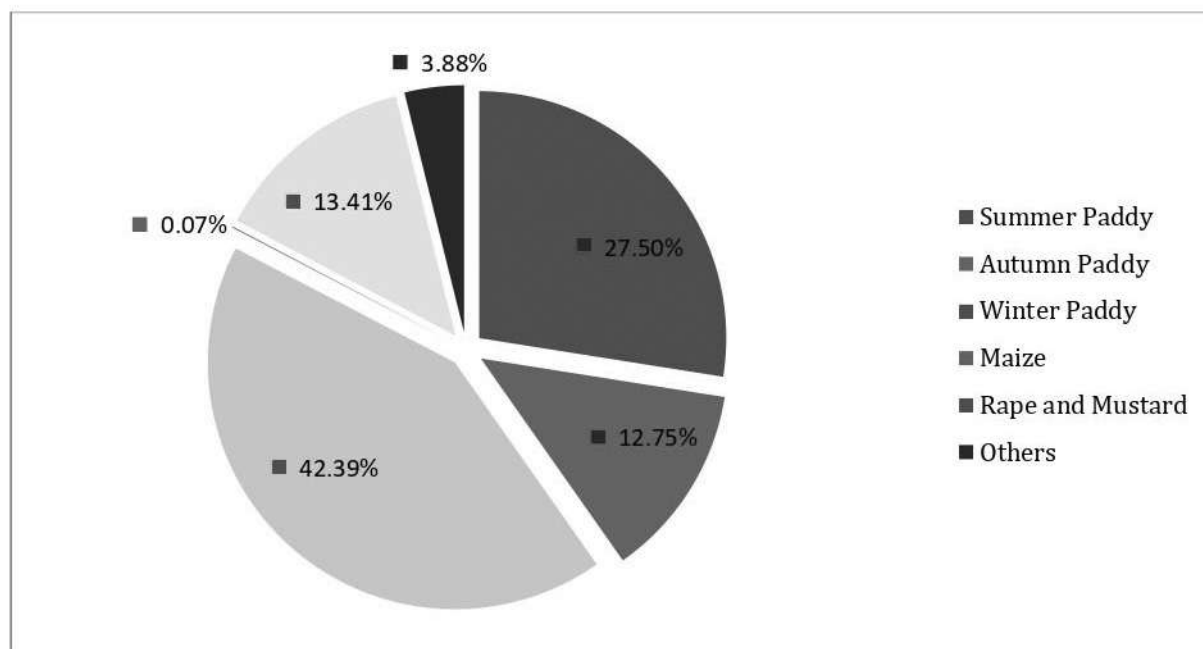
The economy of Dhemaji is based primarily on agriculture. As discussed in section 2.5, more than 55 percent of the workers in the Dhemaji Planning Area are cultivators, as per Census of India 2011. Sericulture and fishery are also practiced but at a smaller scale.

3.2.1 Agriculture

Rainfed alluvial soil of Dhemaji is quite suitable for the cultivation of paddy which is the main crop grown in the area. Based on the sowing and harvesting periods, paddy can be classified into the categories of summer, autumn and winter paddy. **Figure 3.1** provides an idea of the percent of agricultural land under different crops for Dhemaji Planning Area. The figure reveals that more than 41 percent of the area is covered by winter paddy, followed by summer and autumn paddy. Mustard is grown in 13.4 percent of the

area while maize occupies a small share of 0.07 percent. Black gram, turmeric and potato are among the main vegetables grown here.

Figure 3.1: Agricultural Land under Different Crops in Dhemaji Planning Area, 2021



Source: Department of Agriculture, Dhemaji (2021).

The subtropical humid climate of Dhemaji is quite suitable for the cultivation of a wide array of horticulture crops. **Figure 3.2** shows percent share of plantation land covered by different horticulture crops within Dhemaji Planning Area. The maximum area, that is, 46 percent of the total plantation area, is covered by Arecanut, followed by banana and Assam lemon. Arecanut, commonly known as betel nut, is the seed of the East Asian palm tree which is widely grown in Dhemaji and can be found in almost every household. The seed is consumed as a mouth freshener on a regular basis by the people of Assam, including women and young children, and is addictive in nature. Papaya and coconut are among the other fruit crops grown in the area.

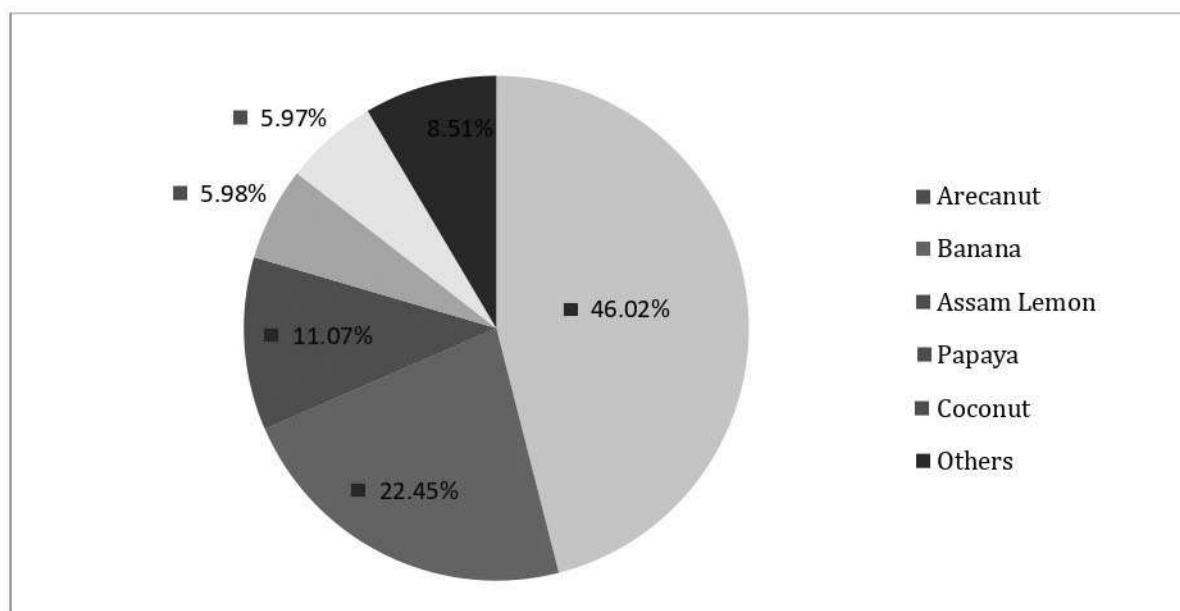
Agriculture in Dhemaji is mostly rainfed as the region has been blessed with heavy rainfall during the kharif⁴ season. However, there is need and scope to improve irrigation facilities as crops are adversely affected due to inadequate supply of water during the rabi⁵ season. Around 93.98 percent of the total cultivable area is rainfed,

⁴ Cropping season from June to October

⁵ Cropping season from November to April

implying that the percent of irrigated area is quite low. Major sources of irrigation include canals, tanks, tube wells, minor lift irrigation, etc.

Figure 3.2: Plantation Land under Different Horticulture Crops in Dhemaji Planning Area, 2021



Source: Department of Agriculture, Dhemaji (2021).

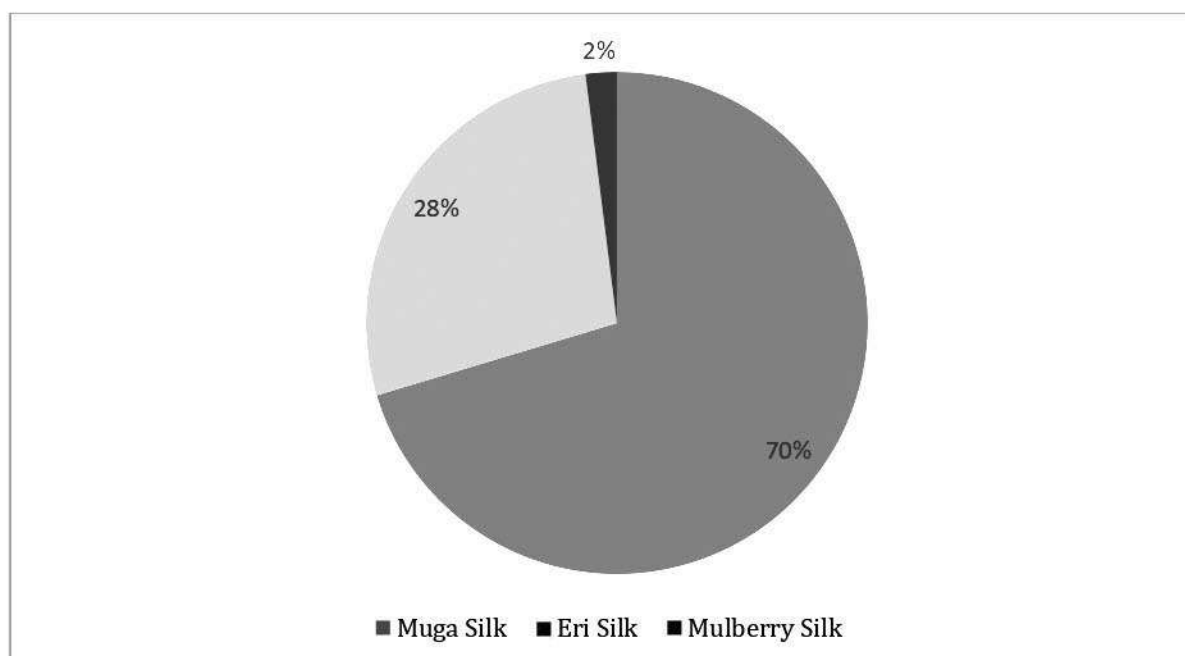
3.2.2 Sericulture

Sericulture, or silk farming, is the rearing of silkworms to produce silk. Assam is the only place in the world where all commercially exploited varieties of silk, that is, *Mulberry*, *Eri*, *Muga* and *Oak tusar* are produced and is the third largest silk producing state in India, sharing around 15 percent of country's total raw silk production. Dhemaji district occupies a unique place in the production of three different kinds of silk, *Mulberry*, *Muga* and *Eri*, which have a very high demand in the national and international markets. In the financial year 2019-20, the total production of raw silk in Dhemaji district was around 20,880 kg, which is around 5 percent of the total silk production of Assam, directly involving around 9,570 farmers in the process.

Percent share of different types of silk produced within Dhemaji district in 2019-20 is given in **Figure 3.3**. Dhemaji is a major *Muga* growing area. *Muga* cultivation is a labour-intensive activity and requires all the members of the household to be engaged in silkworm rearing, silk reeling and weaving. However, the farmers of Dhemaji have suffered tremendously because of the frequent floods which have destroyed the very basis of this industry. The district has been experiencing recurrent floods annually for

the last few years. The worst affected villages include Tinigharia, Patir Chuk, Jiadhal Dihiri, Bhoju Gaon, Hesuli, Panitula, Jiadhal Chariali, Chengeli Pathar, Goroimari, etc.

Figure 3.3: Share and Types of Silk Produced in Dhemaji, 2019-20



Source: Sericulture Department, Dhemaji (2020).

Of these, Tinigharia, Hesuli, Panitula and Chengeli Pathar are located within Dhemaji Planning Area. Floods have destroyed or endangered plantations of the Som plant on which the *Muga* silkworms feed. The Som plantations, known as *Sumonis*, have been gradually destroyed as they have either been displaced, or their roots buried in sandy silt. Unavailability of good quality seeds has severely affected indigenous *Muga* rearing. Because of this, many farmers have been forced to abandon their expertise in silk rearing and shift to other small businesses. The floods of 2015 affected 3,718 hectares of agricultural land in Dhemaji district, thereby pushing around 2,50,000 people to search for alternative livelihoods in the non-agricultural sector.

3.2.3 Fisheries

Dhemaji is endowed with many fishery resources in the form of rivers, ponds, derelict water bodies and beels. Fish occupies a significant place in the lives of the people of Dhemaji and fish farming has been one of the common activities in rural areas. Thus, the fishery is considered as an important enterprise in the socio-economic context. Most of the fishery resources within the Dhemaji Planning Area exist in the form of private

individual ponds or water channels in farm fields. Major Carp and Minor Carp are the popular fish varieties which are bred in large quantities.

3.2.4 Animal Husbandry

Dhemaji has large varieties of livestock species. Agriculture, the predominant activity in the region, is accompanied by cattle rearing, particularly in the rural areas, where cows buffaloes, goats and pigs are a common sight within every household. Besides these, within the urban area, ducks and poultry are also reared in a significant number.

As per the primary survey conducted within Dhemaji town in October 2021, it was found that 32.8 percent households were rearing animals either for their personal use or for the purpose of selling. Of these, 62.19 percent households were rearing cows, 10.97 percent households had dogs, 8.54 percent households were rearing ducks, 10.97 percent households were rearing goats and the remaining 7.31 percent had hens.

3.3 Industry

Establishment of industries plays a crucial role in the urban development of a city. Urbanization typically begins when a factory or multiple factories are established within a region, thus creating a high demand for factory labour. Other businesses such as building manufacturers, retailers, and service providers then follow the factories to meet the product demands of the workers. This creates jobs and demand for housing, thus establishing an urban area.

Table 3.1: Industries in Dhemaji Planning Area, 2025

Type of Industry	Number
Handloom	4
Textile	13
Apparel	2
Rice Mill/Sheller	3
Metal Fabrication	1
Wooden Furniture	2
Food/Beverages	3
Agarbati	2
Drinking Water	1
Plastic Dolls	2

Bamboo Items	1
Total	34

Source: DICC, Dhemaji (2021).

Within the Dhemaji Planning Area, no significant large-scale industries exist, and the small and medium scale industries are limited in number. Of these, handloom, textile and apparel industries are the maximum in number. Other manufacturing and processing activities being carried out in the area include rice milling, rice shelling, metal fabrication, food and beverage production and manufacture of products such as wooden furniture, agarbati, packaged drinking water, plastic dolls, bamboo items, etc. The number and type of these industries falling within the Dhemaji Planning Area are given in Table 3.1.

3.3.1 Handloom and Textile

Handloom sector plays a vital role in the socio-economic development of Dhemaji. There are a total of 60,000 weavers in Dhemaji district of which 15 percent are full time weavers and the rest are part time weavers. The part time weavers are generally engaged in agriculture as well. Weaving being an intrinsic part of the Assamese culture, 90 percent of the weavers are females. In the year 2020, the total production of handloom in Dhemaji district was 2.16 crore running metre.

Handloom industries in Dhemaji use silk as a raw material for weaving because of the extensive production of silk in the area, as discussed in section 3.2.2. Chokham gaon, Gohain gaon, Kuwaphala, Bor gaon, Tanganapara and Bharalichuk are the handloom producing villages falling within the Dhemaji Planning Area. In the town, most of the handloom and textile manufacturing units are located along the station road in Ward 3 and along NH15, near the District Industries and Commerce Centre. However, the main problem that the handloom sector is facing is the absence of a dedicated market for silk goods here because of which a major portion of the profit goes into the hands of the middlemen, that is, the local traders who directly purchase finished goods from weavers in exchange for yarn.

Dhemaji's products are known for their traditional designs and motifs. Tribes like Mising, Deori, Bodo, Sonowal, Kachari, Tiwa, etc. have their traditional unique style of weaving and produce extremely valuable products. These silk products are exported to different parts of India. For instance, some of these products are bought by Delhi

retailers and displayed in the Pragati Maidan. Some weavers have honed their skill overtime and can make saris as well. However, most of the weavers are semi-skilled and produce the clothes in old traditional ways because the cost of the modern-day weaving machine, that is, the Jaquard Machine, is very high. The minimum cost of a machine is Rs 8,000 which is not affordable for most of the weavers. They need to be also trained to be able to operate these machines. Most weavers belong to the BPL category and hence, financial problem is a major issue which is affecting the overall growth of the sector. For additional income, weavers need to work in other places or do part time work. In the rural areas, some weavers work in Self-Help Groups, particularly women weavers, which help them pool their resources and find solutions to problems through rural savings, credit activities and informal finance. Assam Apex Weavers and Artisans Cooperative Federation Limited (ARTFED) is the state level cooperative society to enhance the market for weavers and support their businesses. There are two training institutes in the district where every year 35 students are trained in weaving. More such skill upgradation training programmes could be initiated.

3.3.2 Rice Mills

The rice industry of Dhemaji plays a significant role in boosting its economy. Dhemaji, being a paddy growing area, has immense scope for rice mills and rice shellers. All rice produced in Dhemaji goes to these mills for processing and then is sold in the district itself. However, despite the large-scale paddy production, the procurement of paddy in Dhemaji is relatively less. The reason for less volume of procurement is the inadequate number of modern rice mills in the area. This is true for several other districts of Assam as well. Therefore, under the scheme “Setting up/Upgradation of Rice Mills in Assam” to be implemented by the Food and Supplies Corporation Limited, the state has aimed at providing capital subsidy for establishment of mini modern rice mills as well as technology up-gradation and expansion of existing units. This will increase the level of processing, reduction of wastages, value addition, enhance the income of the farmers, encourage the state’s agriculture production and achieve overall development of food processing sector by patronizing the rice mill industries.

Beria Rice Mill, shown in **Figure 3.4** , is the largest rice mill falling within the Dhemaji Planning Area. However, two years back, the mill was completely shut down on account of recurrent complaints due to the excessive noise and air pollution from the mill, which

became a serious cause of concern for the residents in its vicinity. However, some precautions have been taken and operations in the mill have been restored. The residents are, however, still disturbed by the mill's functioning. Dhemaji College is located adjacent to the mill and students have complained about the disturbance caused due to the extreme vibrations and noise caused when the mill operates. The mill is also situated right in the city centre and is quite close to the Station Road Market and College area. So, the trucks carrying rice from the mill add up to the traffic from the adjacent market and college, often causing traffic jam along the Station Road. So, on account of multiple reasons, the mill's location has been questioned, pointing towards the importance of placing industrial areas away from the residential areas of the city's core.

Figure 3.4: Beria Rice Mill, Dhemaji



Source: Primary Survey, SPA Delhi (2021)

3.3.3 Bamboo and Cane Products

Bamboo base craft is primarily a domestic enterprise and holds a significant position among the state's handicrafts. It provides a part-time job for cultivators and a full-time one for highly experienced artisans who specializes in commercially produced fine decorative baskets, furniture, and mats, among other things.

Bamboo items are primarily produced in rural areas. It is widely followed as a secondary occupation by agriculturists in their leisure time. Its large concentration in rural regions can be linked to the abundance of bamboos in villages and the strong need for various bamboo goods in every rural home, such as mats, baskets, fishing contraptions, and so on. The industry requires the use of a dao and a knife, both of

which are generally found in every family in Dhemaji. Manufacturing tasks are typically carried out outside, and all family members, whether male and female, participate. However, the male members of the family predominate. Most of the products made in such households are intended for domestic use with only a tiny fraction being sold in markets.

Manufacture of cane goods is a significant and developing cottage industry in Dhemaji where cane is in abundant quantities. However, it is difficult to get the thorny cane out of the dense jungles. The Mahaldars⁶ are given leases by the forest authority to extract cane from the forests. Even in the manufacture of everyday items, the industry necessitates a certain level of expertise, but the production of furniture and other objects of artistic worth necessitates a high level of skill. This craft produces many types of furniture and other products like boxes, cradles, cane-stool (murrha), office trays, tiffin baskets, bottle carriers, bicycle baskets, wastepaper baskets, cane chairs, sofa, and so on, particularly in the urban areas. So, in Dhemaji, there is immense potential for producing bamboo and cane goods on a commercial scale. Its products are in high demand not just within the country but outside the country as well.

3.4 Trade and Commerce

Commercial areas, which include wholesale, retail and service shops, reflect the economic buoyancy of a city to a great extent. In Dhemaji town, there are a total of 1,246 commercial establishments, 32 hotels and restaurants and three market complexes. The main market areas are Tiniali, Cheriali and Station Road. Other smaller markets include the PNGB market area, Pegu Bazaar and Dihingia Bazaar. **Figure 3.5** provide a glimpse of the daily vegetable and fish market in Dhemaji town. For the past several years, Dhemaji's commercial activities have been purely located along the main roads. Markets have not also evolved for a specific trade in a specific area, but rather are spread across the entire town randomly. Although the town's retail trade and business has boomed in the last decade, the number of wholesalers and distributors are relatively nominal of which the wholesale of food grains, particularly paddy, is predominant.

⁶ People registered under the Forest Department or in the office of the Chief Conservator of Forest of Assam

Figure 3.5: Daily Market and Fish Market along NH15 in Dhemaji

Source: Primary Survey, SPA Delhi (2021)

Haphazard development of retail and trade centres along NH15 has created a lot of problems for the residents. This is due to the lack of parking facilities and the resulting increase in traffic. To facilitate the daily needs of household goods, it is necessary to develop the retail centres at convenient places throughout the municipal area. Apart from this, there is a daily market near Cheriali and a weekly market along PNGB which act as the principal centres of essential commodities for the people of the town and its adjoining villages.

There are around 160 workshops and repair shops within the town which include motor garages, e-rickshaw and scooter repair, radio and watch repair shops, etc. The transport agencies are mainly located along NH15. There are a total of seven transport agencies in the town which are playing a vital role in transportation of goods to and from Dhemaji. These agencies are connected by roads with other towns of Assam and Arunachal Pradesh. Located in the heart of the town, these agencies face a lot of problems while loading and unloading of goods since NH15 is the main arterial road in Dhemaji and carries a huge amount of traffic.

Commercial survey findings revealed that the types of commodities sold range from jewellery, cosmetics, stationery and garments to seeds, spices, mobile accessories, bamboo products, etc. Around 70 percent of the shops have obtained a licence from the municipality to legalize their operation. More than 95 percent of shops do not have any

godowns or storage facilities. Customers mostly come from within the town and surrounding villages. The market areas are not facilitated with any public toilets, drinking water facility or community bins. Goods are usually imported from Guwahati, Siliguri, Kolkata, Sonitpur and Lakhimpur and sold here. Of all the commercial establishments surveyed, only 20 percent of the shops were owned by the sellers, the remaining were on rent, ranging from Rs 2,000 to Rs 15,000 per month, depending on the location and area.

3.5 Informal Sector

Informal sector component of any economy that is not taxed or regulated by any kind of government is known as the informal economy. Even though the informal sector accounts for a large share of the economies of developing countries, it is sometimes portrayed as difficult and uncontrollable. It is a rational response to high costs of the formal sector.

In Dhemaji, informal sector units, which include vendors and unorganised workers, are scattered all over the city's core, that is, in Ward 1, 2, 3 and 4. These are usually located near work centres, commercial areas outside the boundary of schools, colleges and hospitals and transport nodes. It has been proposed to shift all vendors in the city, including those in the weekly markets to the town's 'Centre for Rehabilitation of Street Vendors' located along the Padma Nath Gohain Bahua (PNGB) road. However, the implementation process for the same is facing some resistance from the vendors who fear that such a shift in location might affect their sales adversely.

3.6 Unemployment

In Dhemaji, unemployment is a burning issue, both in the rural as well as urban areas. The youth, though well educated, find it difficult to get employed in Dhemaji. Being graduates and post-graduates, it is hard for them to do menial jobs and hence, are left with no choice but to join their family in farming. This is the tale of every other household in Dhemaji. The number of registered unemployed in Dhemaji sub-division from 2017 to 2020 has been shown in **Table 3.2**. The number of registered unemployed have increased manifold in 2020 because of the economic downfall and the resulting loss of jobs caused by the Covid-19 pandemic.

Table 3.2: Number of Registered Unemployed in Dhemaji Sub-division from 2017 to 2020

Year	Number of Registered Unemployed			
	HSLC and Metric	HSSLC and PU	Graduates	Total
2017	168	374	416	958
2018	85	190	59	334
2019	82	54	402	538
2020	1,335	4,368	1,350	7,053

Source: Employment Exchange Office, Dhemaji (2021).

3.7 Conclusions

Economy of Dhemaji is generally agro-based. Sericulture, fishing, and driftwood business are practiced at a smaller scale. However, sand deposition and other adverse effects of chronic floods on fertile agricultural land have made even the affluent farmers landless. Dearth of any major and small industry is responsible for multiplying the problem of unemployment within the town and surrounding villages. Some of the small-scale units are registered as weaving or handloom and bamboo industries, however the actual production does not have any market value due to competition from highly finished machine goods that are cheap and maintenance free. The silk industry has the potential to be commercially tapped. Some local people of the area also produce mustard, but they are not able to compete with the non-local businessmen who control the market. Local economy is thus characterized by subsistence level of production and consumption.

CHAPTER 4: HOUSING

4.1 Introduction

A master plan aims to ensure that each person in a town has liveable housing with the necessary infrastructure and facilities. The master plan should also be flexible enough to allow for change over time in housing diversity as communities mature. Here, housing entails more than just buildings; it implies creating liveable neighbourhoods with essential utilities such as access to pucca roads, drainage, water supply, sanitation, social amenities, recreation and livelihood. Residential land allocation, urban regeneration and re-densification projects, public housing, encouraging private participation through incentives, and so on are all examples of planning strategies that aim to provide affordable housing to all. The housing profile of a city includes the state of its houses, their structure, building materials, plot size, building levels, residential densities, etc. Household size, housing ownership and household economic classification are other important aspects to be examined.

4.2 Housing Typology

Dhemaji has evolved a distinct housing typology that is well suited to the climatic conditions of the region. Since the area is prone to floods and earthquakes, it employs building construction techniques which prove to be resilient to disasters. Traditionally, people in Dhemaji have been living in individual houses made up of bamboo and wood due to easy availability of the raw materials. However, due to increase in population and space constraints, there has been unrestricted growth of RCC buildings and multi-storeyed structures. Many of these buildings are not earthquake resistant.

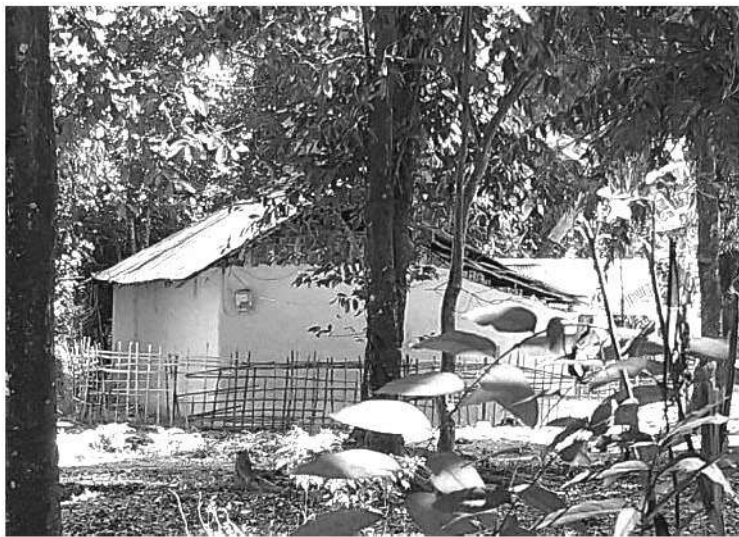
Houses in the outskirts of the town are bigger than those in the city centre. These houses are raised to provide protection from floods. The main types of traditional houses found in Dhemaji include Ikra house, Mud house, Bamboo house and Chang house.

4.2.1 Ikra house

The Ikra house, also known as the "Assam type house," is found throughout northeast India. Typically, low weight locally accessible materials such as bamboo, wooden planks, and thatch are used to construct these buildings. Ikra houses are single storied with

brick or stone masonry walls that extend up to about one metre above the plinth. This masonry supports the walls consisting of bamboo woven together with a wooden frame and plastered with cement or mud plaster. The roof is often made up of GI sheets supported by wood or bamboo trusses that link the parallel walls laterally. These houses are particularly resistant to earthquakes. Figure 4.1 shows an Assam type 'Ikra' house in Dhemaji.

Figure 4.1: Assam type 'Ikra' house



Source: Primary Survey, SPA Delhi (2021).

4.2.2 Mud house

Mud is made up of water and a variety of soil, silt and clay. The average plan dimensions of these structures are 5 to 10 metres in length and 3 to 5 metres in width. The structure is one to two stories tall, and the roofing and flooring system typically spans 3 to 4 metres.

4.2.3 Chang house

This type of house is raised on stilts and is primarily constructed in areas of heavy vegetation, forest, and riverbanks. People from Assam's Mising community traditionally resides in stilted houses which have religious and social beliefs and traditions associated to them. A flight of 5 to 7 stairs leads to the entrance of these houses. For a large joint family, the house on stilts is a wide hall with a central kitchen.

4.2.4 Bamboo house

In this housing system, bamboo is used as the principal structural member. Brick wall is used for modelling. It is also inextricably linked to the plinth as well as the bamboo. The

wall in this system is built of bamboo strips and coated with mud. The house's roof is made of local grass and can survive up to ten years before needing to be replaced. The house's stilts section is designed to protect it from minor floods. **Figure 4.2** shows a bamboo house in Dhemaji.

Figure 4.2: Bamboo House in Dhemaji



Source: Primary Survey, SPA Delhi (2021).

4.3 Housing Shortage

Housing shortage is the total housing need which comprise of dilapidated houses, congested houses and obsolete houses.

The number of houses without a separate room for married couples is used to characterise congestion. 6.5 percent of houses with couples did not have a separate room for them, according to the 2001 Census.

A home that was over 80 years old or between 40 and 80 years old but of poor quality was referred to as an obsolescent house. Nearly, 4.3 percent of households, according to the 58th Round of NSSO, have obsolete houses.

It is assumed that one household is equals to one house. Total estimated housing shortage in Dhemaji planning area is 3,047 houses as per census 2011 (refer Table 4.1).

Table 4.1: Housing Shortage in Dhemaji Planning Area, 2011

Sl.No.	Parameters	Assumptions	Households
A	Existing Housing Stock		16,697
B	Dilapidated Houses	7.45 percent of total households	1,244
C	Housing congestion	6.5 percent of total households	1,085
D	Obsolescence factor	4.3 percent of total households	718
E	Housing Shortage	A-(B+C+D)	3,047

Source: Estimated based on Census of India (2011).

4.4 Housing Condition

The state of structural stability of a house is referred to as its housing condition. According to the Census of India, 'good' housing condition indicates the house needs no repairs, 'liveable' means the house needs minimal repairs, and 'dilapidated' implies the house needs extensive repairs or reconstruction, or houses that have rotted or damaged and are far from being restored or rebuilt.

The Master Planning Area has 43.69 percent of houses in good condition, 48.86 percent in liveable condition and 7.45 percent are dilapidated. In municipal area, 59.99 percent of houses are in good condition, 36.14 percent are in liveable condition and 3.86 percent are dilapidated as shown in Table 4.2.

Table 4.2: Housing Condition in Dhemaji Planning Area, 2011

Housing Condition	Percent Urban	Percent Rural	Percent Planning Area
Good	59.99	27.4	43.69
Liveable	36.14	61.6	48.86
Dilapidated	3.86	11.0	7.45

Source: Census of India (2011).

4.5 Structure of Housing

According to the Census of India, houses can be classified into three categories based on their structural strength. These are permanent, semi-permanent and temporary. Permanent houses are the structures with wall and roof made of permanent materials such as G.I., stone, metal, asbestos sheets, burnt bricks and concrete. Temporary structures have walls and roof made of temporary material such as grass, thatch, bamboo, plastic, polythene, mud, unburnt bricks or wood. In semi-permanent structures, either wall or roof is made of permanent material and the other is made of

temporary material. **Table 4.3** shows that in Dhemaji Planning Area, 27.55 percent of the houses are permanent, 55.42 percent are semi-permanent, and 16.88 percent are temporary. Within the Municipal Area, 44.49 percent of the houses are permanent, 50.29 percent are semi-permanent, and 5.21 percent are temporary. Relatively higher percent of temporary houses in rural areas is because of the traditional use of mud and bamboo for making walls, as discussed in section 4.2.

As per Census 2011, in the urban area, the predominant material used for roofing is G.I., metal or asbestos sheet while in rural areas, bamboo, wood, thatch, etc. are also used. Walls are mostly made using bamboo, mud or burnt bricks. For flooring, cement and mud are the most common materials used.

Table 4.3: Structural Typology of Housing in Dhemaji Planning Area, 2011

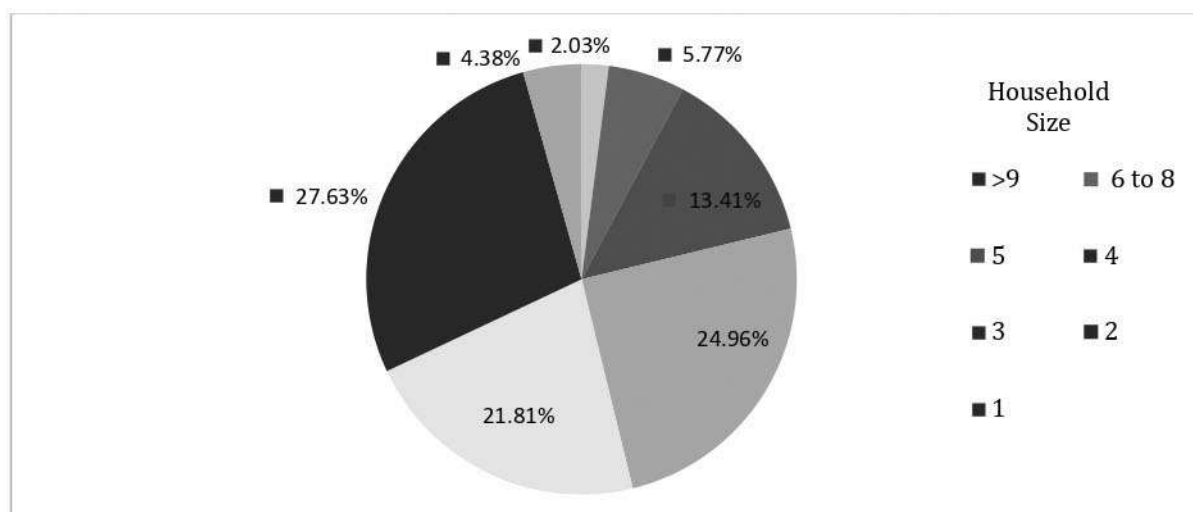
Type of Structure	Urban (percent)	Rural (percent)	Planning Area (percent)
Permanent	44.49	10.61	27.55
Semi-permanent	50.29	60.55	55.42
Temporary	5.21	28.55	16.88

Source: Census of India (2011).

The primary survey findings reveal that 68.7 percent houses in the municipal area have a permanent structure, 21.4 percent houses are semi-permanent and 9.9 percent houses are temporary.

4.6 Household Size

Household size is defined as the ratio of the total population to the total number of households. As per the 2011 Census, the average household size in Dhemaji Planning Area is 4.7 persons. For rural areas, the average household size is 4.9 persons while in the municipal area, the average household size 4.5 persons. The smaller household size in the urban area indicates nuclear family systems. Also, household size 1 accounts for migrants who have come in search of livelihood in the urban area. **Figure 4.3** reveals the number of households corresponding to a particular household size within Dhemaji Planning Area.

Figure 4.3: Household Size in Dhemaji Planning Area, 2011

Source: Census of India (2011).

4.7 Housing Ownership

Ownership status indicates the percentage of owned and rented houses in a city. In Dhemaji Planning Area, 92 percent of houses are owned, and 6.08 percent are rented as stated in Table 4.4. In the urban area, the share of owned houses is 87.4 percent, while in the rural areas, it is 97.6 percent. This is because property rates are relatively less in villages and therefore, people prefer to purchase an accommodation, or a plot of land, instead of paying rent. However, the urban population includes a significant number of migrants who work there and are willing to stay in a rental accommodation.

Table 4.4: Ownership Status of Houses in Dhemaji Planning Area, 2011

Ownership Status	Percent Urban	Percent Rural	Percent Planning Area
Owned	87.4	97.60	92.50
Rented	10.9	1.26	6.08
Others	1.7	1.13	1.42

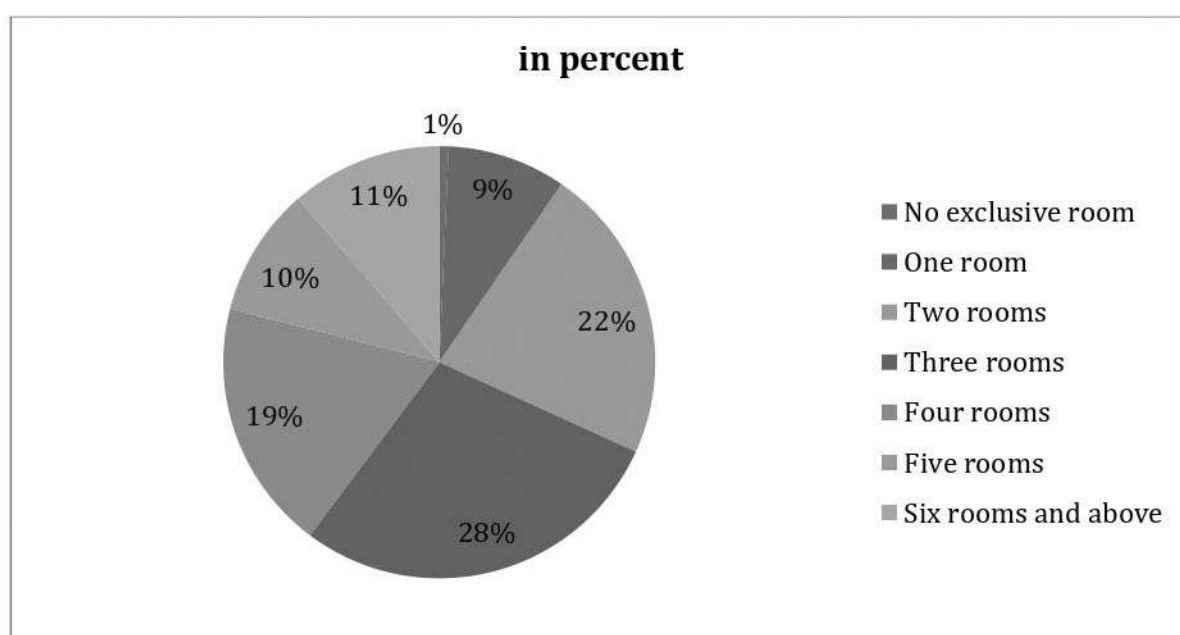
Source: Census of India (2011).

As per the primary survey conducted in 2021, within the Dhemaji Municipal Area, 91.8 percent houses are owned, and 8.2 percent houses are rented. This implies that housing ownership status has improved considerably over the last 10 years. The survey findings also reveal that the monthly rent ranges between Rs. 700 to Rs. 5,000, depending on the housing size, location, and structure.

4.8 Number of Dwelling Rooms

Average number of rooms per household in the planning area is three. Figure 4.4 shows the percent of houses with certain number of dwelling rooms within the Dhemaji Planning Area. Urban and rural share for the same is depicted in **Table 4.5**. Percent of houses with dwelling rooms more than six is 14.2 percent in the urban area and 8.5 percent in rural areas.

Figure 4.4: Houses with Number of Dwelling Rooms in Dhemaji Planning Area, 2011



Source: Census of India (2011).

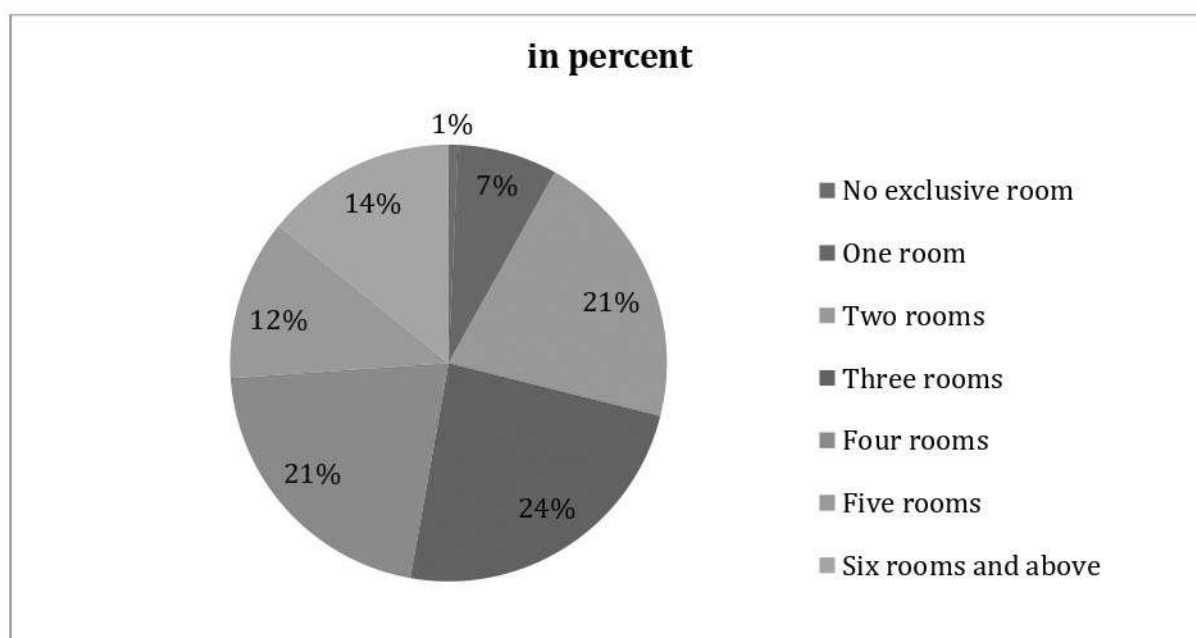
Table 4.5: Number of Dwelling Rooms in Houses in Dhemaji Planning Area, 2011

Number of Dwelling Rooms	Percent Urban	Percent Rural	Percent Plan Area
No exclusive room	0.7	0.7	0.69
One room	7.4	10.4	8.90
Two rooms	20.8	23.6	22.21
Three rooms	23.9	32.9	28.42
Four rooms	21.1	16.4	18.75
Five rooms	11.9	7.5	9.69
Six rooms and above	14.2	8.5	11.34

Source: Census of India (2011).

Maximum households have three dwelling rooms, both in the urban and rural parts of the planning area. However, as per the primary survey conducted in 2021, maximum percent of households in the town, that is, 23.9 percent have four dwelling rooms as depicted in Figure 4.5. This is because, over the years, people have either constructed additional rooms in their house premises or built another storey. It was also observed that in the existing town area, that is, wards 1, 2, 3 and 4, the size of houses is relatively small and in the newly added wards, that is, wards 5, 6, 7, 8, 9 and 10, the houses are relatively bigger in size resulting in an increase in the average number of dwelling rooms in the town.

Figure 4.5: Houses with Number of Dwelling Rooms in Dhemaji Municipal Area, 2011



Source: Census of India (2011).

4.9 Housing Provision

Pradhan Mantri Awas Yojana-Urban (PMAY-U) is a flagship Mission of the Government of India which was inaugurated by the Ministry of Housing and Urban Affairs (MoHUA) in 2015. By 2022, the Mission aims to address the urban housing crisis among the EWS, LIG and MIG categories, including slum dwellers, by ensuring a pucca dwelling for all the eligible urban households. In Dhemaji town, a total of 362 houses have been constructed so far under PMAY-U and another 1,205 are under construction as per the report submitted by the Dhemaji Municipal Board in September 2021. The stagewise physical status of houses under PMAY-U in Dhemaji town is shown in **Table 4.6**.

Table 4.6: Provision of Houses under Pradhan Mantri Awas Yojana in Dhemaji Municipal Area from 2015 to 2021

Total target of Beneficiaries (DPR-wise)	1st DPR	164
	2nd DPR	823
	3rd DPR	481
	4th DPR	1,569
	Total	3,037
Number of Beneficiaries Fund Received	1st installment	1,576
	2nd installment	1,045
	3rd installment	322
	Total	2,943
Stagewise Physical Status of Construction	Not Started	9
	Foundation	650
	Lintel	448
	Roof	107
	Completed	362
	Total Houses under construction	1,205

Source: Dhemaji Municipal Board (2021).

4.10 Conclusions

Since Dhemaji is prone to floods and earthquakes, building techniques that have proven to be disaster-resistant are used here. Due to the cheap availability of raw materials, the natives of Dhemaji have traditionally lived in individual dwellings made of bamboo and wood. However, due to population expansion and space constraints, RCC buildings and multi-storied structures have grown in the last decade. Many of these structures are not built to withstand earthquakes.

As per census 2011 total housing shortage of Dhemaji planning area is 3047 houses. As over 7.45 percent of houses in the planning area are dilapidated and need to be renovated to improve their condition. Temporary structures account for 16.88 percent of the total housing. These structures are worst affected at the time of floods and therefore, need to be retrofitted to make them adapt better to natural calamities. The demand and supply of housing needs to be analysed to further aid in determining the town's housing shortage.

CHAPTER 5: TRAFFIC AND TRANSPORTATION

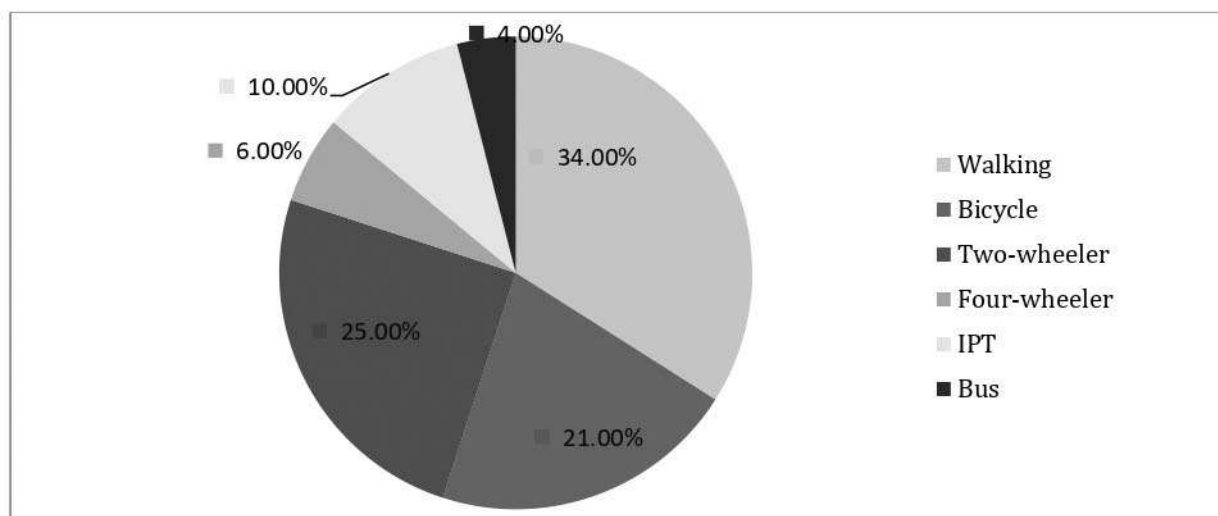
5.1 Introduction

Passenger and goods transportation movement, as well as their linked concerns, play a crucial role in enabling the city system's productivity and promoting the city's and region's welfare. The master plan aims to develop a transportation system that is best suited to Dhemaji's geographical setting and supports the town's social and economic activities. Transportation improves connectivity, allowing people to get better access to employment, services, health care and education. In this way, the transportation system of a city has direct impact on the community's quality of life.

The present low level of development in the Dhemaji Planning Area is due to the inadequacy of transportation facilities. Although the town is connected with the rest of the state by roads, the connectivity is not adequate enough to meet the requirements and gets frequently disrupted during monsoons. The transportation profile, therefore, shall include the road and rail network, travel characteristics, traffic volume, parking availability, public and private transportation system, etc. This chapter focuses mainly on analysing the existing traffic and transportation scenario in the Dhemaji Municipal Area.

5.2 Travel Characteristics

Every form of travel is characterized by mode choice, duration, length, or stops. These travel characteristics are treated as travel attributes and reflect the individual travel behaviour. **Figure 5.1** depicts the mode share of Dhemaji town based on the primary survey conducted by SPA Delhi team in October 2021. Walking is the principal mode of travel for 34 percent of commuters. However, the town's pedestrian infrastructure is yet to be developed and even the arterial roads do not have a footpath. Bicycling is the principal mode of travel for 21 percent of commuters and 25 percent of commuters utilise a two-wheeler as their primary mode. Around 6 percent commuters travel by a four-wheeler and 10 percent rely on Intermediate Public Transport (IPT). Only 4 percent commuters within the Municipal Area use buses as their primary mode of travel. Buses are not available in the rest of the planning area.

Figure 5.1: Mode of Travel in Dhemaji Municipal Area, 2021

Source: Primary Survey (2021).

Vehicle ownership is another significant characteristic to understand the travel pattern within a city. In **Table 5.1**, as per Census 2011, within the Dhemaji Planning Area, 68 percent of households own bicycle, while 35 percent own two-wheeler and 11 percent own four-wheeler. The proportion of people who own two-wheeler or four-wheeler is higher in the urban area than in rural areas. Overall, within the Planning Area, the ownership of four wheelers stands at 3.7 percent.

Table 5.1 Vehicle Ownership in Dhemaji Planning Area, 2011

Type of Vehicle	Urban (percent)	Rural (percent)	Planning Area (percent)
Bicycle	68.7	66.9	67.2
Two-wheeler	35.8	11.4	15.3
Four-wheeler	11.4	2.2	3.7

Source: Census of India (2011).

5.3 Road Network

The evolution of Dhemaji town has occurred along its major transportation lines. The town's principal road, NH15, runs through the centre of town and usually carries a high volume of traffic, particularly in morning and evening. It must be noted that there is no discernible structure of road network in the rest of the town. Internal roads, which connect scattered developments, stem out haphazardly from the main roadways. To solve this, a well-planned road network is required.

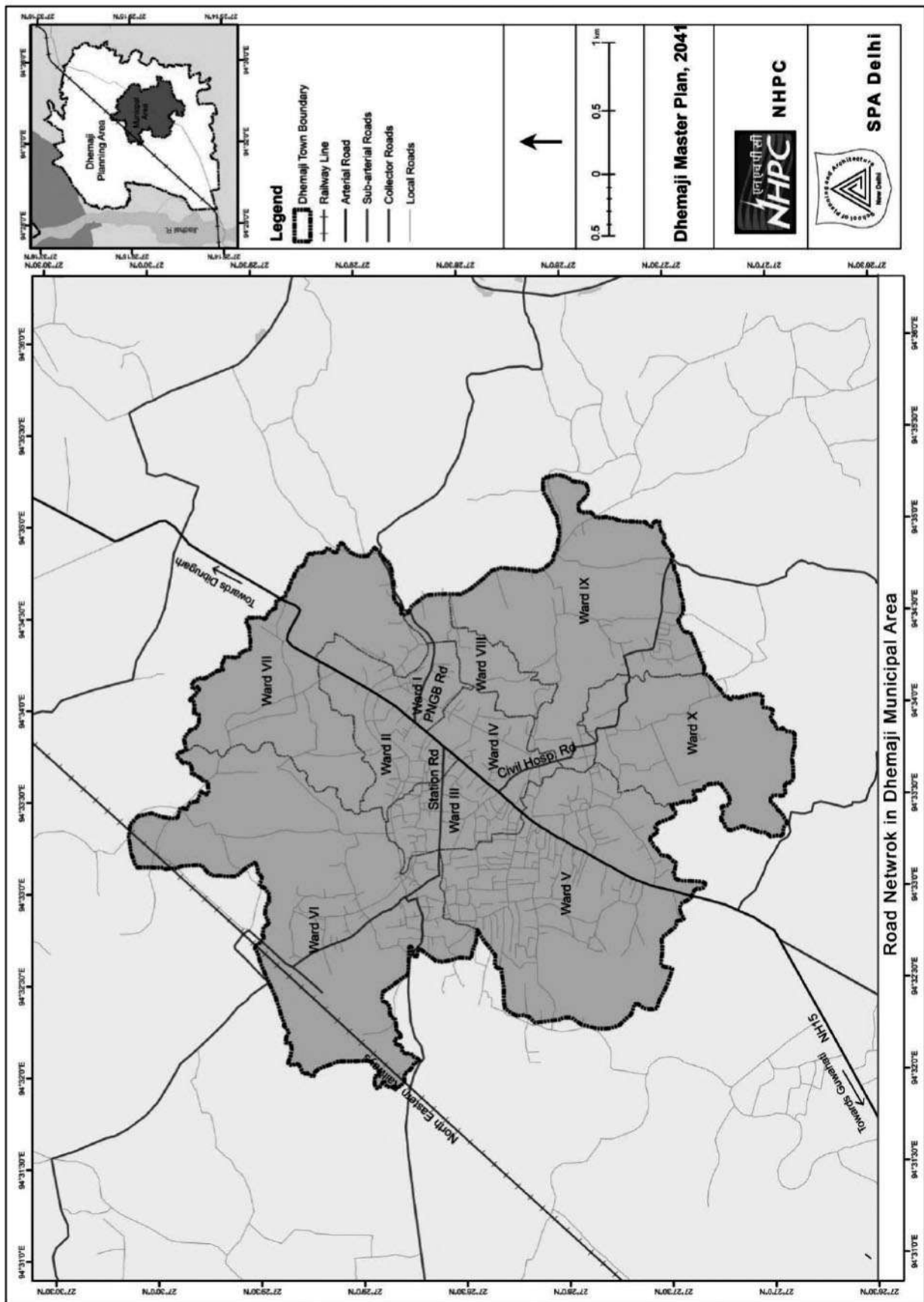
5.3.1 Road Hierarchy

Broadly, roads in a town can be classified as arterial, sub-arterial, collector and local roads. Arterial roads serve as the principal network for carrying heavy traffic flow. Significant intra-urban travel takes place through arterial roads. Within the Dhemaji Municipal Area, NH15 acts as the main arterial road. Significant commercial and institutional development have taken place along this road. Sub-arterial roads are functionally similar to arterial roads but with somewhat lower level of travel mobility. Collector roads collect traffic from local streets and feed it to arterial and sub-arterial roads and vice versa. These may be located in residential neighbourhoods, business areas and industrial areas. Within the Dhemaji Municipal Area, Station Road, Padma Nath Gohain Bahua (PNGB) Road and Civil Hospital Road fall in this category. Local streets are intended primarily to provide access to adjoining properties and normally do not carry large volumes of traffic. Majority of trips in urban areas originate from or terminate on these streets.

Error! Reference source not found. shows arterial, sub-arterial, collector and local roads within Dhemaji Planning Area. Town's principal arterial road is NH15. It is two-lane undivided road with only seven-meter carriage width. On both sides of the road, there is parking space. However, footpaths for pedestrian movement have not been constructed. There is commercial and institutional development along the road, but no dedicated pathway arrangements, even though the pedestrian count is significant. In fact, Tiniali and Cheriali market areas, which are the major commercial zones of Dhemaji town are located along NH15. So, a lot of loading and unloading activities take place along this road. However, no dedicated space has been allotted for loading and unloading activities. This aggravates the problem of traffic congestion. The Station Road, PNGB Road and Civil Hospital Road are other major roads of the town along which a significant number of commercial establishments are located. Of these, Station Road has the highest volume of traffic, after NH15.

5.3.2 Road Surface Classification

Broadly, roads can be classified as surfaced and unsurfaced. Surfaced roads are the ones which are provided with bituminous or cement concreting surface while unsurfaced roads are usually made of soil or gravel. Within the Dhemaji Municipal Area, the total length of roads is 560 km of which 170 km is surfaced and 390 km is unsurfaced.

Figure 5.2: Road Network in Dhemaji Municipal Area, 2021

Source: SPA Delhi (2021).

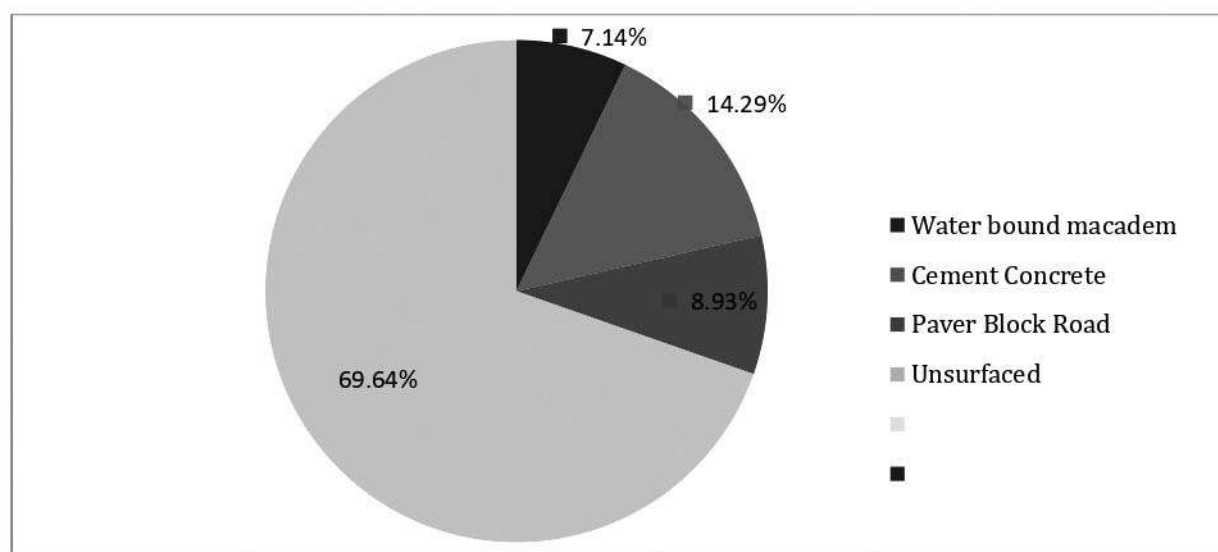
Surfaced roads could be further divided into three types: water bound macadam (WBM), cement concrete and paver block. Water bound macadam roads are constructed from broken stone aggregates bound together by stone dust or screening material and water. Cement concrete roads are all weather roads with their wearing surface made from cement concrete. Paver block roads are made using concrete paving bricks which are porous in nature. Unsurfaced roads, on the other hand, are either motorable or non-motorable depending on their strength and durability to withstand vehicle movement. The length of surfaced and unsurfaced roads in Dhemaji Municipal Area is shown in **Table 5.2**. The primary survey findings reveal that NH15, Station Road, Civil Hospital Road and PNGB Road have been constructed using cement concrete, but the Police Reserve Road has been made by using paver blocks. Some local roads leading to residential areas also have concrete paving. Most of the internal roads are kuccha roads, which are generally made of mud or soil.

Table 5.2: Length of Surfaced and Unsurfaced Roads in Dhemaji Municipal Area, 2016

Total Length (km)	Surfaced (km)				Unsurfaced (km)		
	Water bound macadam	Black top and Cement concrete	Paver Block Road	Total	Motorable	Non-Motorable	Total
560	40	80	50	170	280	110	390

Source: Dhemaji Municipal Board (2016).

Figure 5.3: Surfaced and Unsurfaced Roads in Dhemaji Municipal Area, 2016

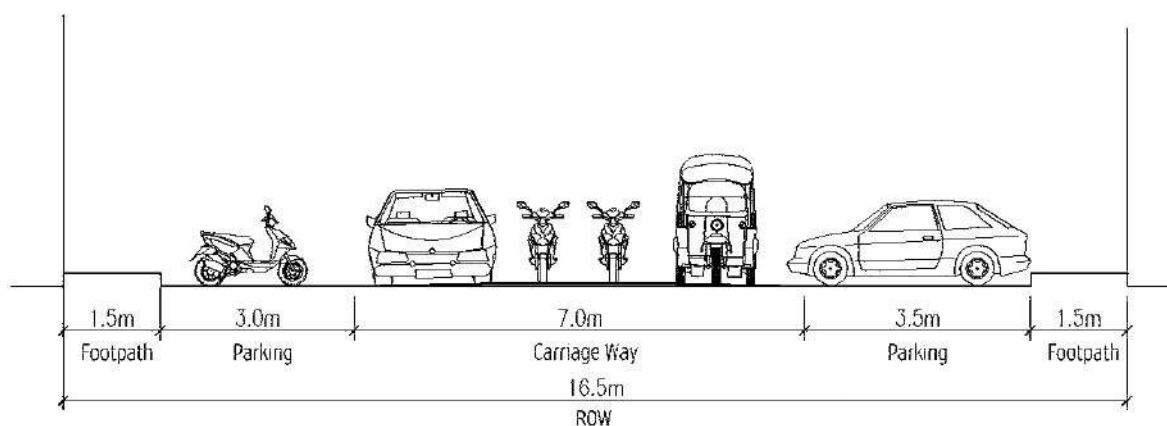


Source: Dhemaji Municipal Board, 2016

5.3.3 Road Width Classification

Based on carriage width⁷, roads within Dhemaji Municipal Area could be broadly classified into five types. These are 7 metres, 5.5 metre, 5 metre, 4 metre and 3-metre-wide roads. Here, NH15 is the 7 m wide road with a parking space of 3 m and 3.5 m on either side. There is a 1.5 m wide footpath on each side which is in a dilapidated state and needs repair. Drainage network along NH15 runs beneath the footpath on one side. **Figure 5.4** shows the typical cross-section of NH15 in Dhemaji Municipal Area.

Figure 5.4: Typical Cross-section of NH15 in Dhemaji Municipal Area

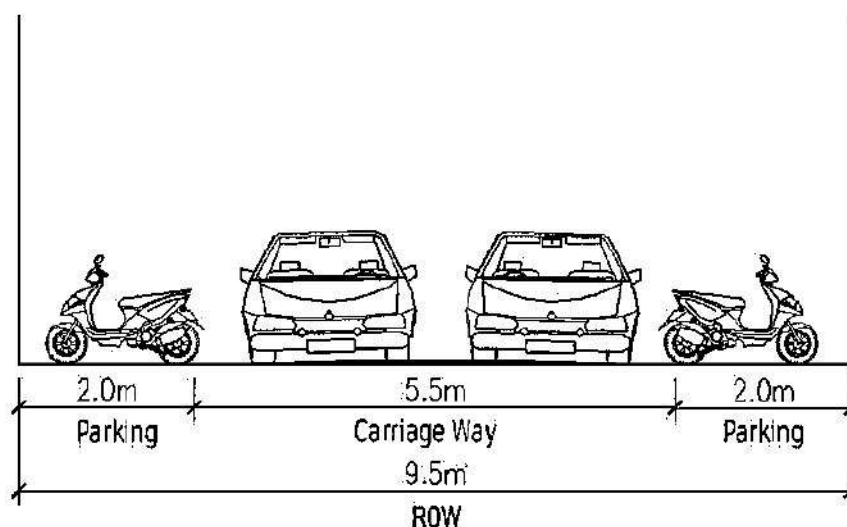


Source: Primary Survey, SPA Delhi (2021).

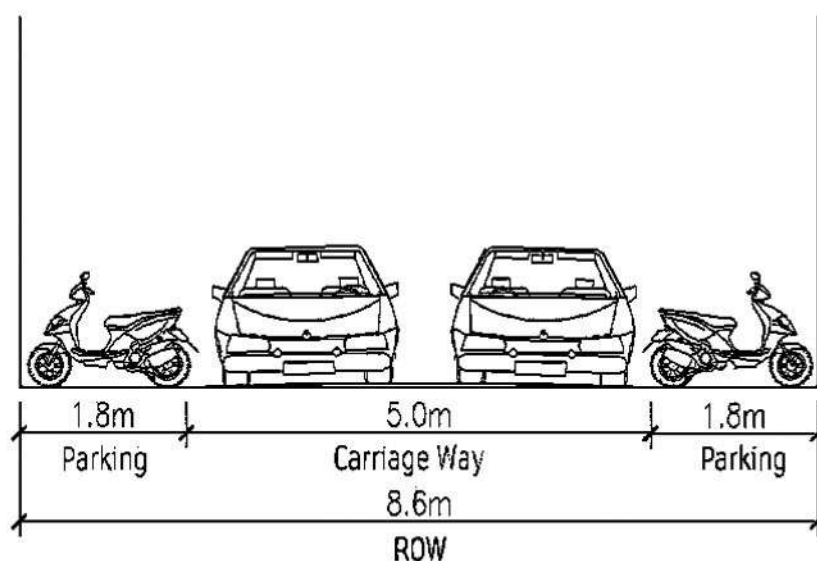
The Station Road which connects the town's core to the Dhemaji Railway Station has a carriage width of 5.5 metre with a parking space of 2 m on both sides. Significant number of shops, banks and commercial establishments are located along this road due to which traffic congestion is a major problem here. Also, the parking space is not enough to meet the requirement. **Figure 5.5** depicts the typical cross-section of Station Road. Padma Nath Gohain Bahua (PNGB) Road and Civil Hospital Road fall in the category of roads with 5 metre carriage width and a parking space of 1.8 m on both sides. Although these roads have commercial units along their sides, the number is relatively less and so is the traffic volume. **Figure 5.6** depicts the typical cross-section of PNGB Road.

The cross sections of the main roads in Dhemaji Municipal Area are not as per the IRC standards for urban roads.

⁷ Carriage width is the width of road including shoulders and auxiliary lanes devoted solely to the movement of vehicles.

Figure 5.5: Typical Cross-section of Station Road, Dhemaji

Source: Primary Survey, SPA Delhi (2021).

Figure 5.6: Typical Cross-section of PNGB Road, Dhemaji

Source: Primary Survey, SPA Delhi (2021).

5.3.4 Road Safety

Most of the roads in Dhemaji are in a dilapidated state due to inadequate repair and maintenance. This is particularly true for the local roads which are at a lower elevation as compared to NH15 and get waterlogged during the rainy season (see Figure 5.7).

Figure 5.7: Dilapidated Road in ward 8, Dhemaji

Source: Primary Survey, SPA Delhi (2021).

As discussed in section 5.3.2, around 70 percent of the roads in the town are unsurfaced which makes the movement of vehicles all the more cumbersome.

Street lighting is a major problem along these roads. Most of the streetlights are not functional. Even along NH15, though streetlights are installed, they were found to be non-functional since the last one year and need to be repaired. The Municipal Board reported that in the year 2021, around 12 high mast lights were installed in the town to resolve this issue. However, during the primary survey, problems faced due to the absence of streetlights were highlighted by residents, particularly in ward 1 and 4. The existing number of streetlights in Dhemaji Municipal Area is given in Table 5.3.

Table 5.3: Number of Street Lights in Dhemaji Municipal Area, 2021

Type	Number
High Mast	12
50-Watt Street Lights	180
Project Jyoti Street Lights	47
Total	239

Source: Dhemaji Municipal Board (2021).

5.4 Traffic Characteristics

NH15 and Station Road are the main roads of the town with moderately high volume of traffic and congestion due to the extremely narrow carriageways. As roads are undivided, the two-way traffic movement causes hindrance along with on-street

parking, resulting in slow movement of traffic. The Station Road is particularly congested in the afternoon hours due to the traffic caused by the vehicles carrying students from SFS school and Dhemaji College. SBI bank branch, which was once located along the Station Road, had to be shifted to another location along NH15 because of the increasing volume of traffic in the area which had begun to hinder the bank's operations. **Figure 5.8** shows the traffic congestion on Station Road.

Classified Traffic Volume Count (TVC) Survey was conducted on NH15 and Station Road by the SPA Delhi team in October 2021. The survey is used to calculate the Level of Service (LoS) of a road along with related attributes such as peak hour, carrying capacity, V/C ratio, etc.

As per the primary survey, the Level of Service (LoS) for NH15 is D indicating stable flow with restricted speed of vehicles (**Table 5.4**). For Station Road, the Level of Service is E which shows that the traffic flow is unstable and irregular. Therefore, improvement in road network is urgently required in terms of enhancing road capacity and planning new networks to decongest the existing traffic on these roads.

Figure 5.8: Traffic Condition in Dhemaji, 2021



Source: Primary Survey, SPA Delhi (2021).

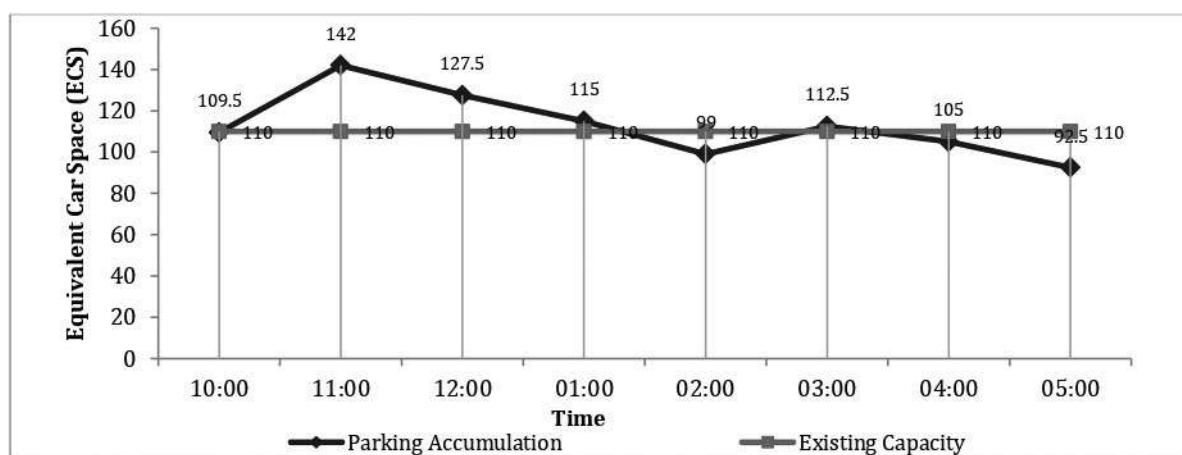
Table 5.4: Level of Service for NH15 and Station Road in Dhemaji Planning Area

Road Name	PCU ⁸ (12 Hour)	PCU (Peak Hour)	Peak Hour	Volume/Capacity (V/C)	Level of Service
NH15	12,800	1,920	10:45 to 11:45	0.8	D
Station Road	7,200	1,080	15:00 to 16:00	0.9	E

Source: Primary Survey, SPA Delhi (2021).

5.5 Parking

Parking is a serious issue in Dhemaji town, particularly along NH15 and Station Road, where the main market areas are located. Both on-street two-wheeler and four-wheeler parking is permitted along roadside; however, the space is not enough to meet the required parking demand. To analyse the parking requirement of the town, a survey was conducted by SPA Delhi team from 10:00 a.m. to 6:00 p.m. on NH15 and Station Road. On NH15, a 250 meter stretch from the SP Office to Reliance Trends showroom was chosen for the survey. The existing capacity of the stretch is estimated as 110 ECS⁹. The number of automobiles (in ECS) parked at a certain interval of time, that is, the parking accumulation is shown in **Figure 5.9**. The survey revealed that number vehicles parked along the stretch are of shop owner and worker. The parking accumulation is higher than the existing capacity of the stretch between 11:00 am and 1:00 pm, pointing towards the need to provide additional parking space for NH15.

Figure 5.9: Parking Accumulation for NH15 in Dhemaji Municipal Area

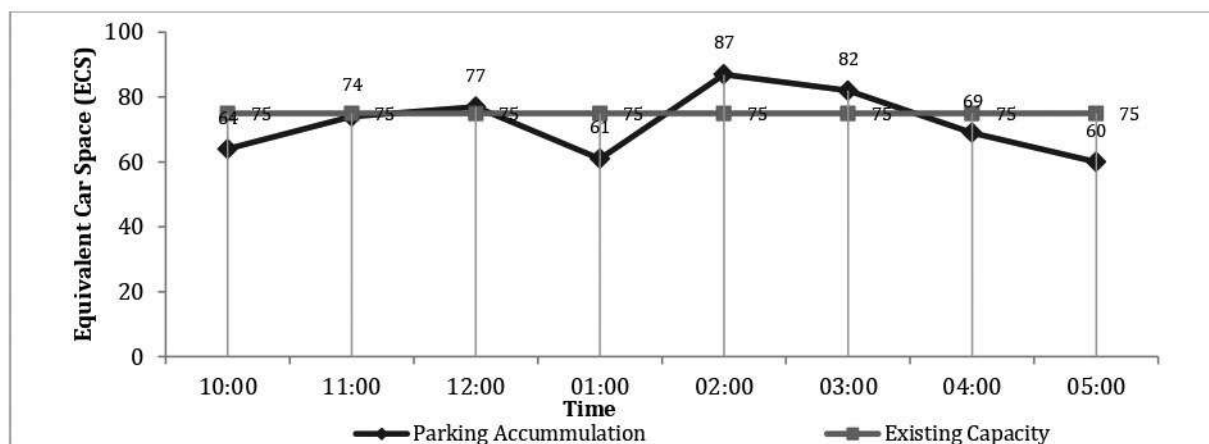
Source: Primary Survey, SPA Delhi (2021).

⁸ Passenger Car Unit: a measure of the impact that a mode of transport has on traffic variables compared to a single car.

⁹ Equivalent Car Space

On Station Road, a stretch of 150 m was selected between the Rice Mill and Vishal Megamart Store. The existing capacity of the stretch is estimated as 75 ECS. Parking accumulation is higher than the existing capacity of the stretch between 2:00 pm and 4:00 pm (Figure 5.10). This is because of the vehicular traffic from the schools, college and government offices in the area around this time.

Figure 5.10: Parking Accumulation for Station Road in Dhemaji Municipal Area



Source: Primary Survey, SPA Delhi (2021).

5.6 Transport Connectivity

Transportation system can be defined as the combination of elements and their interactions, which produce the demand for travel within a given area and the supply of transportation services to satisfy this demand. Transportation enhances connectivity, which enables access to jobs, services, livelihood, health and education; directly influencing the quality of life in an area. Therefore, one of the key mechanisms through which infrastructure services can affect economic growth, competitiveness and quality of life is through improvements in transport networks. Transport connectivity may directly increase productivity, lower costs, improve access, enable exports and deliver agglomeration economies.

5.6.1 Road Connectivity

NH15 acts as the lifeline for facilitating transportation connectivity for Dhemaji town. It passes through the heart of the town in the east-west direction and is the only means of access to Arunachal. The road serves as an important link for the movement of people and goods within the planning area. This is because Dhemaji is connected to all the nearby urban centres of the district, such as Silapathar and Jonai, via NH15. This road

carries a high volume of traffic from surrounding towns, including trucks and buses, which further aggravate congestion in the core town area. In the central area of the town, motor vehicles, rickshaws, bicycles, bullock carts, animals and pedestrians juggle through the same road. So, it becomes necessary to convert NH15 into a two-lane road with adjoining footpaths and underground pucca drains.

NH15 goes towards Dibrugarh and Lahoal via the Bogibeel bridge. The bridge is a combined road and rail bridge over the Brahmaputra River, which was started in the year 2002 and was completed in the year 2018. Being the longest rail-cum-road bridge in India, measuring 4.94 kilometres, the bridge has greatly improved the connectivity of Dhemaji to Dibrugarh. Another National Highway, NH515, separates from NH15 near Kulajan, Silapathar; and ends at Pasighat passing through Jonai and Silapathar.

5.6.2 Railway Connectivity

The town is served by the Dhemaji railway station of the Rangiya railway division, which offers broad-gauge train service to Guwahati and Murkongselek. Dhemaji Railway Station is around 2 km away from the core town area and serves as the main railway station here. Bordoloni, Jiadhal, Moridhal, Sripani, Sisibargaon, Silapathar, Archipathar Halt, Dipa, Simen Chapari, Telam, Laimekuri, Jone Karrang, Murkongselek are all the other minor railway stations. The list of major trains connecting Dhemaji to other urban centres is given below.

- Kamakhya - Murkongselek Intercity Express runs from Jonai to Guwahati via Dhemaji.
- The Tinsukia-Naharlagun Express connects Tinsukia and Naharlagun (Arunachal Pradesh)
- Rangiya - Murkongselek Passenger runs from Jonai to Rangia via Dhemaji.
- Dekargaon - Murkongselek Passenger line connects Jonai and Tezpur.

5.6.3 Air Connectivity

Since Dhemaji does not have an airport of its own, it must rely on the other districts for air connectivity. However, by virtue of its location, it has three airports in the surrounding districts and state.

- Dibrugarh's Mohanbari Airport is located 79 kilometres from Dhemaji town and provides major air connectivity.

- Lakhimpur's Lilabari Airport is 69 kilometres from Dhemaji town.
- Pasighat Airport in Arunachal Pradesh is located 128 kilometres from Dhemaji town and serves as the primary choice of air connectivity for the Jonai subdivision.
- Tezpur airport, also known as Salonibari airport, is located around 269 km from Dhemaji.

5.7 Mode of Transportation

It has been observed that a mix of traffic modes reduces the traffic carrying capacities of the roads. At present, there is no intra-town mass transportation system and people usually rely on autos and e-rickshaws for commuting within the town. **Table 5.5** shows the registration of vehicles in Dhemaji sub-division from 2016 to 2020. It can be seen that the registration for two-wheelers, that is, scooters and motorcycles has been the highest for all five years, followed by cars and passenger-carrying three-wheelers. Also, the registration for e-rickshaws within the town has increased drastically in the year 2018. As per the information shared by the District Transport Office, of the year 2018, registered e-rickshaws started operating in Dhemaji officially. E-rickshaws were operating before as well in small numbers under the supervision of the Dhemaji Office, but these were not registered. Apart from this, there has been a steady increase in the number of registrations for good carrying vehicles, tractors, dumpers, etc. Overall, we can see that the number of registrations of vehicles per year has been increasing since 2016. There has been some decline in 2020, perhaps because of the pandemic, but overall, this indicates an overall increase in vehicle ownership.

Table 5.5: Registration of Vehicles in Dhemaji Sub-division from 2016 to 2020

Year	2016	2017	2018	2019	2020
Bus	13	10	14	21	5
Dumper	16	30	38	83	60
e-Rickshaw	1	1	155	65	135
Excavator (C)	105	9	20	30	38
Excavator (NT)	2	5	-	-	-
Goods Carrier	45	80	180	279	136
M-Cycle/Scooter	3,326	4,553	5,225	6,743	4,766
Motor Cab	70	67	137	220	46
Motor Car	461	596	845	987	768
Three-wheeler (Goods)	3	18	27	43	23
Three-wheeler (Passenger)	244	249	369	593	215

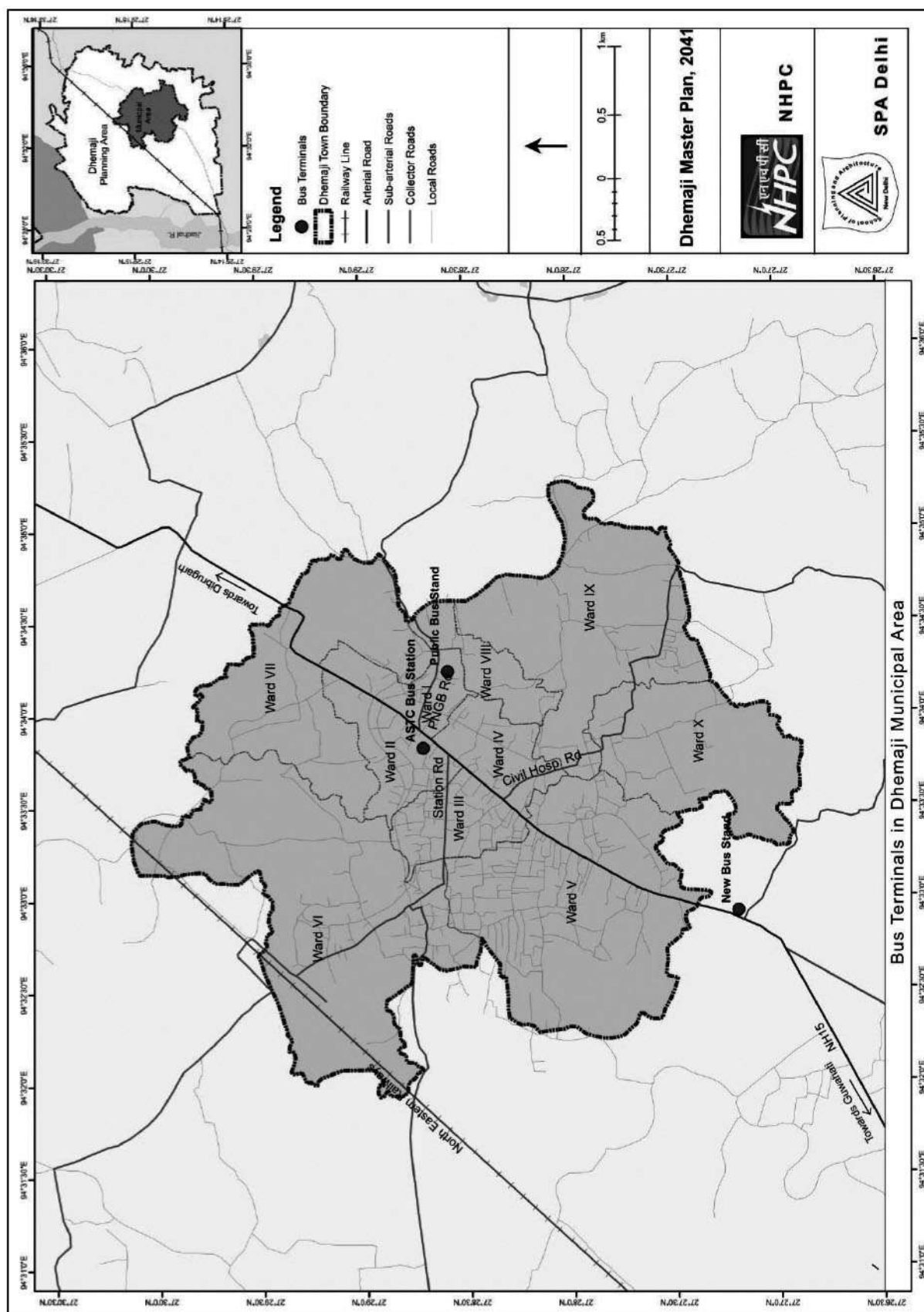
Year	2016	2017	2018	2019	2020
Tractor (Commercial)	69	55	237	47	191
Trailer (Agricultural)	34	24	201	17	80
Total	4,346	5,697	7,448	9,128	6,463

Source: District Transport Office, Dhemaji (2021).

5.8 Transport Terminals

In order to analyse the traffic problem, it is very essential to examine the suitability of the location of the existing transport terminal centres of the town in relation to its traffic modes. At present, there are three bus terminals in Dhemaji town, of which two are public bus stands and one is a private bus stand. The location of these bus stands is shown in **Figure 5.11**. The Assam State Transport Corporation (ASTC) Bus Stand is centrally located and, there is adequate space for efficient movement of public buses. However, private buses also wait to collect passengers outside the ASTC Bus Stand leading to obstruction in traffic and chaos. Altogether, 52 public buses run daily from Dhemaji, since the bus stand is located in the central core of the town, these buses have become a major cause for heavy traffic. So, there is a need to expand available road space to accommodate both public and private buses.

Figure 5.11: Bus Terminals in Dhemaji Municipal Area, 2021



Source: District Transport Office, Dhemaji (2021).

5.9 Conclusions

NH15 passes through Dhemaji town, connecting it to the nearby towns of Bordoloni, Gogamukh, Silapathar and Jonai. It serves as a lifeline for Dhemaji by facilitating transit connectivity. It is the sole way to get to Arunachal Pradesh and acts as a vital link for the movement of people and goods in and around the planning area. NH15 runs through the town's centre in an east-west direction. Converting NH15 into a two-lane road with adjacent footpaths and underground pucca drains is required.

The traffic problem in Dhemaji is not due to the high growth of the fast-moving vehicles but because of the unplanned road network, centrally located bus-terminal, insufficient parking space, narrow roads, defective road termination and non-maintenance of roads. These issues need to be tackled comprehensively. Traffic congestion worsens during the monsoon season at the time of heavy rains when most of the local roads are water-logged.

CHAPTER 6: WATER SUPPLY AND DRAINAGE

6.1 Introduction

Distribution of water by government utilities, commercial organisations, community activities, or individuals, usually through a system of pumps and pipes, is termed as water supply. Public water supply systems are essential for settlements to function properly. Continuity of supply, water quality, and water pressure are all aspects of service quality of the water supply system. In different countries and locations, institutional responsibility for water delivery is organised differently. It usually deals with legislation and regulation as well as service delivery and standardisation. A secure water supply system is the foundation of a strong economy, but it is grossly undervalued. Poor and inadequate water supply system poses serious health risks including water borne diseases. At present, less than half of Indian population has access to safely managed drinking water.

In Dhemaji town, the primary source of water supply is groundwater. Piped water supply scheme has not been implemented yet by the Municipal Board because of which people have dug borewells and tube wells within their house premises to meet their water requirements. Some households access water through handpumps.

This chapter explores the supply and availability of water in Dhemaji Planning Area by focussing on water availability, water quality, continuity of supply, water demand, etc.

6.2 Sources of Water

Both surface water and groundwater are major sources of water for meeting the water needs of the population. For single residences and small towns, groundwater is a typical source, while rivers and lakes are the most prevalent sources of water for large cities.

Dhemaji district has abundant supply of groundwater. Thick and extensive alluvial deposits of excellent hydraulic properties having rich ground water resources underlie the region. According to a report by the Central Ground Water Region Board (CGWRB), the estimated gross annual dynamic groundwater resource in Dhemaji district is 1,376.96 million cubic metre (mcm) while net ground water resource is 1,308.11 mcm. Pre-monsoon water depths range from 0.01 to 9.40 metre below ground level (mbgl), while post-monsoon water depths range from 0.56 to 8.26 mbgl. This is indicative of the

easy availability of groundwater in Dhemaji which is sufficient to meet its household, industrial and irrigation needs.

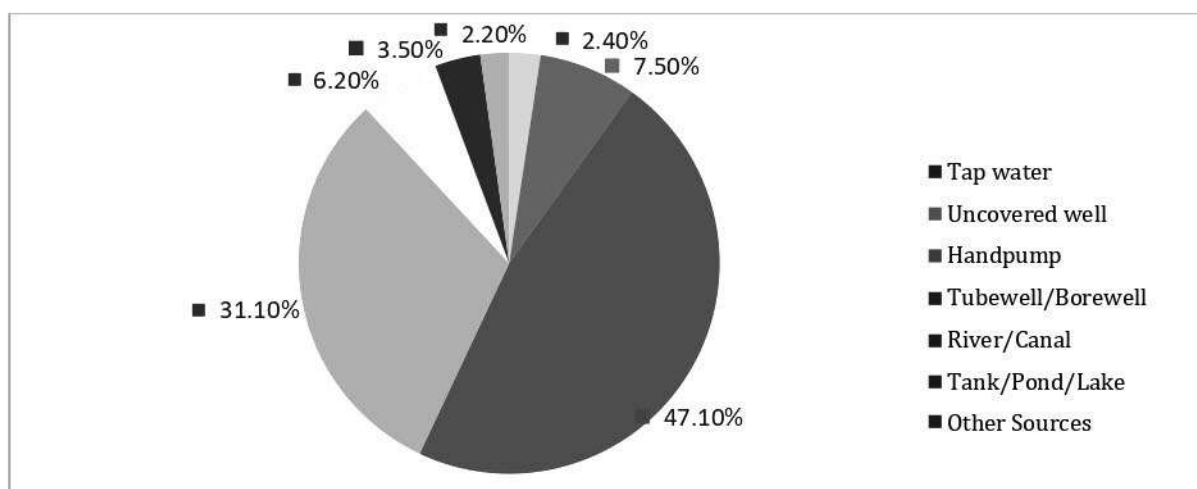
In Dhemaji Planning Area, the main source of water supply is groundwater. The total water consumption comprises of domestic and non-domestic consumption, including water requirements for industrial, commercial and institutional uses, hospitals, hotels, gardens, etc. In the absence of a piped water supply system for the entire town, ground water is extracted at the household level through wells, handpumps, tube wells, tanks, etc. Some households have connected pump for drawing ground water to an overhead tank from where water gets distributed in the entire house through a network of pipes. **Table 6.1** shows the percent share of the main sources of drinking water in urban and rural parts of Dhemaji Planning Area. The overall situation is shown in **Figure 6.1**.

Tap water is the most convenient way to get water. Within the municipal area, 5.3 percent households have access to tap water. Around 60.9 percent households have handpumps and 24.6 percent households have tube wells or borewells as the main source of drinking water. Water from wells is another important source of supply, with 5.7 percent of households relying on it. However, water from well is frequently exposed to contamination, particularly in the rainy season.

Table 6.1: Share of Various Drinking Water Sources in Urban and Rural Areas of Dhemaji Planning Area

Drinking Water Source	Urban (percent)	Rural (percent)	Planning Area (percent)
Tap water	5.3	1.8	2.4
Uncovered Well	5.7	7.6	7.5
Handpump	60.9	44.3	47.1
Tube well and Borewell	24.6	32.3	31.1
River and Canal	0.2	7.4	6.2
Tank, Pond and Lake	0.1	4.3	3.5
Other Sources	3.2	2.3	2.2

Source: Census of India (2011).

Figure 6.1: Main Sources of Drinking Water in Dhemaji Planning Area

Source: Census of India, 2011

In rural areas, 1.8 percent homes rely on water from wells for their domestic needs. Flooding is a common occurrence in the planning area. Wells being inaccessible during floods, are not the best option, particularly uncovered wells. Handpumps, which are more cost-effective, are better as the water is not tainted. Around 44.3 percent households in rural areas use handpumps and 32.3 percent households have tube wells or borewells. It is worth noting that the Jal Jeevan Mission places a strong emphasis on establishing tap water connections in rural areas.

Overall, within the Planning Area, handpumps, tube wells, borewells and uncovered wells have emerged as the major source of drinking water.

6.3 Location of Drinking Water Source

Access to safe drinking water is an essential need as well as a human right. Securing water access for all, especially the vulnerable people, can go a long way towards lowering illness and death.

As per the Census of India, 2011, access to drinking water at the household level can be determined with respect to the location of drinking water source for households which can either be within the premises, near the premises or away from the premises. This is depicted in **Table 6.2**. Within the municipal area, 90.9 percent households have drinking water source within the premises. However, in rural areas, 58.1 percent households have water source located in the premises. Thus, compared to urban areas,

accessibility is much lower in rural areas. This can be attributed to the relatively higher percent of wells in rural areas.

Table 6.2: Location of Drinking Water Source for Households in Dhemaji Planning Area, 2011

Location of Drinking Water Source	Urban (percent)	Rural (percent)	Planning Area (percent)
Within premises	90.9	58.2	63.5
Near premises	6.5	29.4	25.7
Away	2.6	12.4	10.8

Source: Census of India (2011).

6.4 Water Quality

A study conducted by the Central Ground Water Board in 2014 revealed that in Dhemaji district, for shallow aquifers, most of the parameters such as pH, total dissolved solids, calcium, magnesium, chlorine, carbonates, etc. are within permissible limits. It was also found that fluoride content ranging from 0.30 to 2.50 ppm during pre-monsoon and from 0.05 to 0.58 ppm during post-monsoon, was found to be within the permissible limit during post-monsoon but became unsafe for drinking during pre-monsoon.

For deeper aquifers, all parameters were found to be within the permissible limits. As per the report, the chemical quality of groundwater in Dhemaji showed high concentration of iron and arsenic content which was greater than the permissible limit set by BIS and WHO. This was confirmed during the primary surveys as well where residents, particularly in ward 8, complained about the poor quality of ground water and they were not sure if it was fit for drinking purposes. Because of the high iron content in ground water, purification techniques need to be adopted in order to make it drinkable.

6.5 Drainage

Stormwater removal is an essential environmental health intervention for reduction of ailments. Stormwater that has not been properly drained creates stagnant pools, which serve as breeding grounds for disease vectors. As a result, some diseases are more prevalent during the rainy season when it is more humid than during the dry season.

As noted earlier, Dhemaji town is a flood-prone area. However, within the town, flooding gets aggravated by the poor drainage system which often leads to property

losses and damages. Urban flooding can also wreak havoc on water supply infrastructure and contaminate drinking water supplies. The drainage system in Dhemaji town is neither well connected nor continuous leading to water logging during the rainy season. Our survey findings reveal that water often enters into house premises causing damage to household property. The issue of water logging is the worst in ward four, in and around Bherpara, as a result of which roads have been completely damaged in this area and are in urgent need of repair.

As per reports gathered from Dhemaji Municipal Council, drain construction and repair has been done in the town under the 14th and 15th Finance Commission in selected stretches along NH15. In September 2021, 0.483 km long drain was constructed near the Circuit House. **Table 6.3** shows the length of pucca and kucha drains in Dhemaji Municipal Area. Total length of pucca drains is 26 km while that of kucha drains is 299 km.

Table 6.3: Length of Stormwater Drains in km in Dhemaji Municipal Area

Total length of Drains	Pucca Drain	Kucha Drain
325 km	26 km	299 km

Source: Dhemaji Municipal Board (2021).

There are three major drainage lines within the town.

- Drains covering ward 4 and ward 10 which opens near the crop fields in Pahukari January.
- Drains in ward 2, ward 3 and ward 6 which ends in Eradhil river.
- Drains along NH15 which opens in Telijan river near the cremation ground and covers ward 1, ward 5, ward 7, ward 8 and ward 9.

Figure 6.2 depicts the stormwater culverts and their outlet points in Dhemaji town. The primary survey results indicate that 21 percent of the households in Dhemaji Municipal Area have been affected by urban flooding in the last five years and the poor drainage network is a major cause behind this. Clogging of drains and disconnected culverts is a major issue as shown in **Figure 6.3**. On the whole, the drainage network is not well-connected in Dhemaji town. Hence, stormwater drainage needs to be taken up as a priority to resolve the issue of urban flooding.

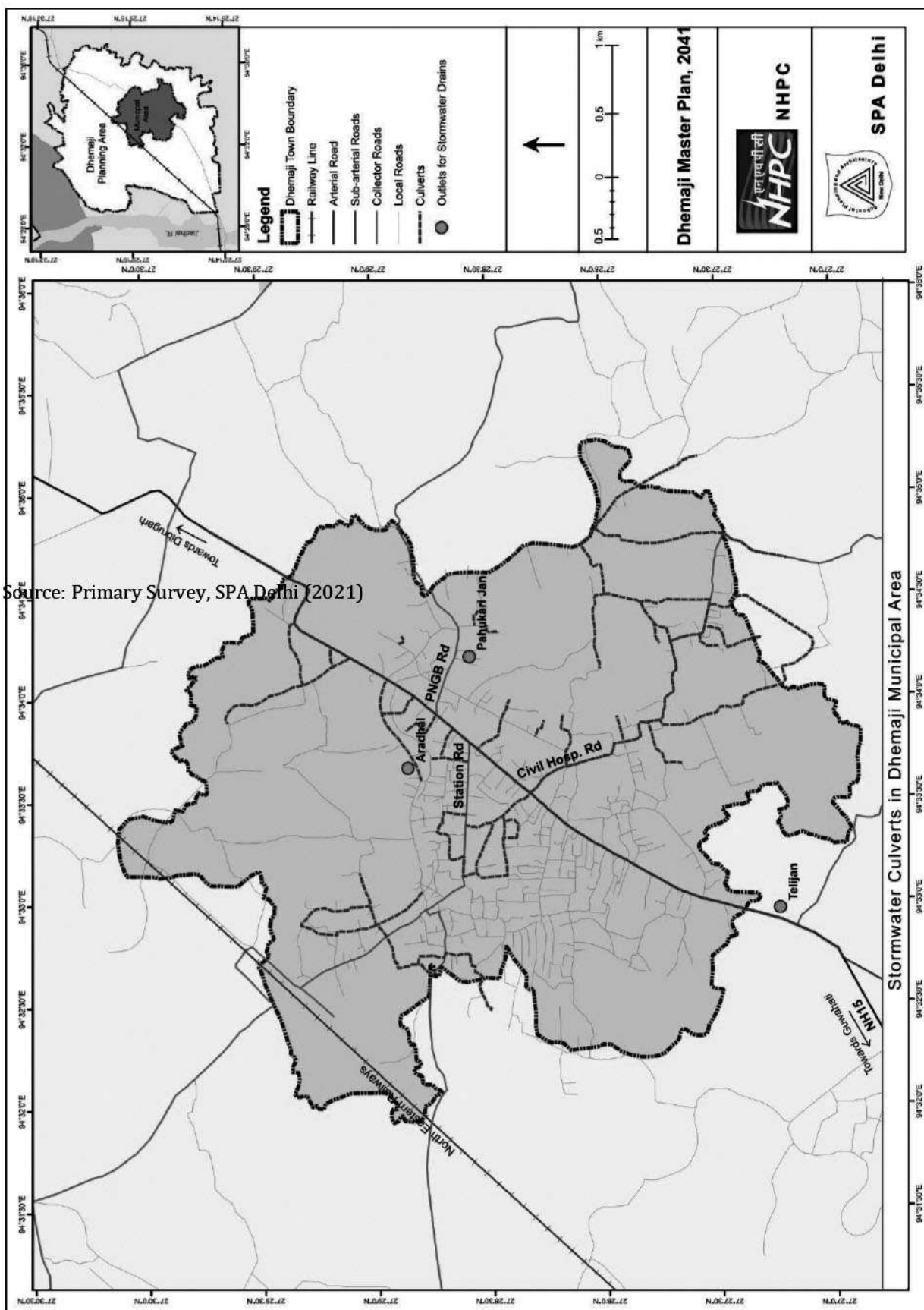
Figure 6.2: Stormwater Culverts in Dhemaji Municipal Area, 2021

Figure 6.3: Condition of Drains in Dhemaji

Source: Primary Survey, SPA Delhi (2021).

6.6 Conclusions

Groundwater is the principal source of water in the Dhemaji Planning Area. The municipality has not implemented piped water supply scheme within the town. So, ground water is retrieved at the household level through wells, handpumps, tube wells, tanks, and other means. The chemical quality of Dhemaji's ground water is not as per the required standards. A high quantity of some dangerous elements, including iron and arsenic, has been found which exceed the permissible limit set by BIS and WHO.

Because of the existing hydrogeological setup and the abundance of ground water resources, there is a lot of room for ground water development by building ground water abstraction facilities. In the near future, tube wells or filter point wells could also be used. Iron treatment plants and water supply stations by the Public Health and Engineering Department (PHED) must be established as soon as possible for drinking purposes. The presence of arsenic in shallow ground water necessitates immediate investigation, and based on the findings, water from very deep aquifers should only be distributed. A large number of tube wells under the Public Health and Engineering Department are currently inactive or have very low discharge. Rehabilitation of these wells is to be carried out so as to mitigate water scarcity.

The drainage system of Dhemaji is inadequate, resulting in regular flooding of highways and streets during the rainy season. The drains are not well connected or continuous which often leads to water logging within the town. So, construction and repair of stormwater drainage system must be prioritised. Since the town is prone to flooding, construction of drains along the natural drainage network would be preferable.

CHAPTER 7: SOLID WASTE MANAGEMENT

7.1 Introduction

Municipal Solid Waste Management refers to the processes involved in the collection, transportation, treatment, and disposal of solid waste created by all categories of municipal population while making the most efficient use of available resources. Local governments are generally responsible for providing solid waste management services, and nearly all local government regulations provide exclusive authority to municipalities to collect all wastes placed outside of houses or workplaces. Solid waste collection and disposal is an important part of public service delivery and public health system and should be prioritised. Failing to provide such services can lead to a slew of negative consequences in the long run, including adverse effects for public health and the environment.

In recent years, India's municipal solid wastes, which comprise rubbish, metals, bottles or glass, plastics, paper, and fabric, has increased due to population growth, increased income, rapid urbanisation, technology, and peoples' poor throw-away culture. For numerous reasons, Indian towns are generally characterised by inadequately supplied services, including garbage management, which is the most disregarded of all the fundamental services. According to UNEP (2004), solid waste generation has become a growing environmental and public health issue around the world, particularly in developing countries like India, where rapid urbanisation and population increase has resulted in massive amounts of solid and liquid garbage, thereby polluting the environment and depleting resources. This is because most laws and frameworks governing solid waste management have previously been oriented to service providers, with little attention paid to recycle and reuse of solid wastes.

In Dhemaji Planning Area, solid waste management is an issue of grave concern. Door-to-door collection is absent in the interior residential areas of the town. Most households dispose wastes along main roads from where it is collected by pickup vehicles. This often results in piling up of garbage which is unsafe and poses health risks. Other households bury the organic part of waste and burn the inorganic part near the house premises. Hence, such environmentally and hygienically unsafe disposal of

urban solid wastes need to be checked and an efficient solid waste collection and disposal system needs to be put in place for the entire town.

7.2 Waste Collection

The fundamental goal of a trash collecting strategy is to collect as much source-separated wastes as possible in a timely and cost-effective manner, in order to make the future waste sorting or treatment stage easier, with the goal of maximising re-use and recycling.

Waste collection strategies are designed and implemented by waste authorities based on the feature of collecting zone, such as population density, as well as public acceptance of various collection methods. The most effective methods for municipal solid waste collection are often implemented via door-to-door or kerbside collection rounds from households and businesses, or at municipal garbage collection centres. Complementary systems that target specific waste fractions like glass, can also be employed for different waste fractions.

7.2.1 Primary Collection

Primary collection system is necessary to ensure that waste stored at source is collected regularly. Primary collection of waste starts at source, after generation of waste from households, institutions, commercial establishments, markets, healthcare establishments, industrial activities, etc.

In Dhemaji Municipal Area, sweeping and collection of wastes is neither done on daily basis nor regularly. The primary survey revealed that the overall services provided by Dhemaji Municipal Board are not satisfactory. Door-to-door collection for household wastes does not take place. Because of this, residents were seen throwing wastes on streets, roads or open drains. **Figure 7.1** give a glimpse of garbage disposed in stormwater drains and open areas within Dhemaji town. Along the commercial areas, that is, Tiniali, Cheriali, Station Road market and PNGB road, the pick-up vehicle does collect wastes once or twice a week. Source segregation of wastes is also not done in any area and mixed waste covering biodegradable, recyclable, demolition or construction and inert waste are disposed of in open areas resulting in foul smell and odour, proliferation of flies and other disease vectors.

Present strength of sweepers and primary waste collectors in Dhemaji Town is relatively less. There is no system of superimposed inspection and monitoring the overall performance. The details of *Safai Karmcharis* engaged in waste collection for Dhemaji Municipal Area are given in Table 7.1.

Figure 7.1: Dumping of Solid Waste



Source: Primary Survey, SPA Delhi (2021).

Table 7.1: Details of Safai Karmcharis in Dhemaji Municipal Area, 2021

Particulars	Number
Total Safai Karmcharis	17
Permanently employed	Nil
Appointed on Contractual/Fixed Pay basis	17
Daily Wage earners	Nil
ID Card provided to	17

Source: Dhemaji Municipal Board (2021).

At present, daily sweeping is done only in the core area of the town where markets and administrative offices are located. Contract sweepers are appointed for cleaning and sweeping work in the town area. Road sweeping generally begins early in the morning and the waste collected is thrown into the nearest community bins. Dhemaji Municipality is solely responsible for road cleaning inside the town. As of now, no private parties are involved in these services.

7.2.2 Secondary Collection and Transportation

Secondary collection is the process where the waste, after primary collection, is taken from the transfer station to the final disposal site. For secondary collection, a total of 18 fixed community bins are placed within the town, including the main market areas. All fixed bins are uncovered and open. Overall, at present, there is no arrangement for segregated waste collection at the primary and secondary level. The frequency of waste collection from community bins is once per day. However, there is no containerization of wastes. Dhemaji Municipal Area has three waste collection vehicles to collect waste from the community bins and roadside collection points as shown in **Table 7.2**.

Table 7.2: Vehicles for Waste Collection in Dhemaji Municipal Area, 2021

Type of Vehicle	Number
Tractor	1
Bolero Pick-up Van	1
Mini JCB	1

Source: Dhemaji Municipal Board (2021).

So, the number of waste collection vehicles are not sufficient for providing adequate service and collection from roadside is also irregular in nature. The sweepers have not been provided with any safety kits to prevent direct contact with the wastes.

7.3 Waste Disposal

Waste disposal refers to the process involved in the removal of waste products, either by dumping, burying or incineration. Since household level waste collection is absent in Dhemaji, residents usually dispose of wastes on their own. So, the non-biodegradable wastes, which includes plastics, metals, etc. is usually burned, and the biodegradable wastes such as food waste, is buried beneath the ground anywhere near their house premises. Very few households which are located near the commercial areas make the effort to dispose their waste in the community bins from where it can be collected by the pick-up vehicle.

A temporary landfill located in Moridhul Khajua in the ULB's own land is being used for waste disposal currently. Total area of the dumpsite is 41,490 sq m. However, since the site is at 7.9 km from the core town, another temporary dumping site is being used and

is located next to the weekly market in an area of around 126.5 sq m. as depicted in **Figure 7.2**. Waste gets picked from the dumping ground near the weekly market and is finally disposed of in Moridhul Khajua or is taken to a nearby waste processing facility. The location of these dumping sites is depicted in **Figure 7.3**.

Figure 7.2: Temporary Dumping Site Behind Weekly Market in Dhemaji



Source: Primary Survey, SPA Delhi (2021).

It is evident that the present crude method of dumping in Dhemaji Municipal Area is totally unhygienic and ultimately leading to environmental hazards like water and land pollution and health related risks.

7.4 Waste Processing and Recycling

Waste processing is the process by which solid waste is physically or chemically changed, temporarily stored, or salvaged prior to being transferred to a solid waste disposal area or to a secondary materials recovery facility. The process of transforming waste resources into new materials and things is known as recycling.

The average waste generated within the Dhemaji Municipal Area is 3 tons per day (TPD) and the town's total waste processing capacity is 1.8 tons per day (TPD), as reported by the Municipal Board. Currently, 3 decentralised waste processing facilities are operational in Dhemaji town, the details of which are shown in **Table 7.3**.

Legend

- Planning boundary
- Municipal boundary
- Village boundary
- Ward boundary
- Waste Disposal Site
- Villages with no plastic dump
- Railway Line
- Reserved Forest Area
- Rivers

0 0.75 1.5 3 Kilometers

Dhemaji Planning Area Landuse, 2022

NHPC **NHPC.Ltd**

SPA New Delhi

Waste Disposal Site in Dhemaji Master Plan

Source: Swachh Bharat Mission-Gramin (2021).

Table 7.3: Operationalized Waste Processing Facilities in Dhemaji Municipal Area

Facility Type	Status	No. of Units	Capacity (TPD)	Type of Waste Processed	End Product
Centralized Plant (proposed)	Not operational	1	0.4	Wet	Manure
Decentralized Plant	1 unit is operational	3	0.4	Wet	Manure
Material Recovery Facility (MRF)	Not operational	1	1	Dry	Recycled Product

Source: Dhemaji Municipal Board (2021).

The end product obtained from wet waste is manure which can be further used in agriculture. For dry waste, a material recovery facility with a capacity of 1 TPD does exist but is not made fully operational. It must be noted that the decentralized processing facilities are privately owned by farmers who usually shut these for some time, if adequate amount of revenue is not generated. Collection and transfer of wastes to these privately owned plants is also a tedious task.

Solid wastes in Dhemaji Municipal Area consist of recyclable parts like paper, plastic, cloth, rubber, glass, ceramic, metal, etc. However, due to lack of source segregation, all recyclable wastes are disposed of in the present landfill site without any sorting.

7.5 Bio-medical Waste

There is no separate collection of bio-medical waste from health centres and hospitals. The hospitals are using covered and uncovered plastic bins, zinc buckets and wooden bins for storing waste.

The Dhemaji Municipal Area has inadequate system for collection of healthcare waste separately. All healthcare establishments make use of community bins for disposal of general wastes. For disposal of anatomical wastes, that is, body parts, pathological specimens, organs, tissues, etc., they use their own resources for open burning or burying. Health care workers (safai Karmcharis) collect medical wastes along with municipal solid wastes without taking any precautions. This practice poses grave threat to the health of health care workers.

7.6 Conclusions

Solid wastes management system is highly inadequate and disorganized in Dhemaji town. Only one dump site exists, and efforts are being made to make the second dump site operational. Recycling or reuse of wastes are not being done adequately at the town level and no centralized compost plant is operational at present. To tackle the problem of solid waste management and to promote cleanliness in the town, Dhemaji Municipal Board needs to set up a greater number of community bins in the area. Door to door collection of waste must be facilitated for which more pick-up vehicles would be required. Preventive, maintenance and monitoring measures must be implemented to ensure adequate collection, transportation and disposal of solid waste. For biomedical and hazardous waste, source segregation becomes really important.

A new disposal site needs to be developed and operated following the guidelines provided under the MSW Rules, 2016 issued by the Ministry of Environment, Forests and Climate Change (MOEFCC). So far, no studies have been carried out to determine the effect of waste disposal operations on the surrounding environment in Dhemaji town.

CHAPTER 8: SANITATION

8.1 Introduction

Poor sanitation service provision and ineffective wastewater management are responsible for 2,80,000 deaths due to diarrhoea each year across the world. This implies that inefficient sanitation in cities can hamper progress on a number of priority areas which are essential for urban development. It is undeniable fact that sanitation and wastewater management play a pivotal role in improving public health. Despite the fact that every dollar spent in sanitation generates roughly five dollars in economic returns, several people still lack access to a well-managed sanitation system in India. While sanitation and wastewater management are now higher on the development agenda, there is a widespread lack of leadership in this sector. Many actors in the sanitation chain are typically fragmented, and there is absence of coordinated planning and oversight needed to keep faeces out of communities, bathing and drinking water supplies and food.

In the Dhemaji Planning Area, access to proper sanitation is a serious issue. Since the sewerage network has not been installed at the town level, most of the households have set-up private latrine facilities in their homes in the form of flush latrines or pit latrines. However, inadequate and inappropriate disposal of septage from these latrines creates environmental and health risks. This is great public health challenge for the town authorities.

8.2 Households with Latrine Facility

In the absence of the sewerage network in Dhemaji town, households have no choice but to install latrine facilities on their own. The field survey findings reveal that residents have built septic tank¹⁰ or pit latrine¹¹ at the household level.

Table 8.1 depicts the percent of households without latrine facility in Dhemaji Planning Area as per Census of India 2011. In the urban area, 92.3 percent households have a

¹⁰ A buried, watertight tank which receive and partially treats sanitary wastewater. Heavy solids stay at the bottom of the tank while the wastewater is drained out.

¹¹ A type of toilet that collects human feces in a hole in the ground

toilet while in the rural areas, 50.2 percent households have a toilet within their house premises.

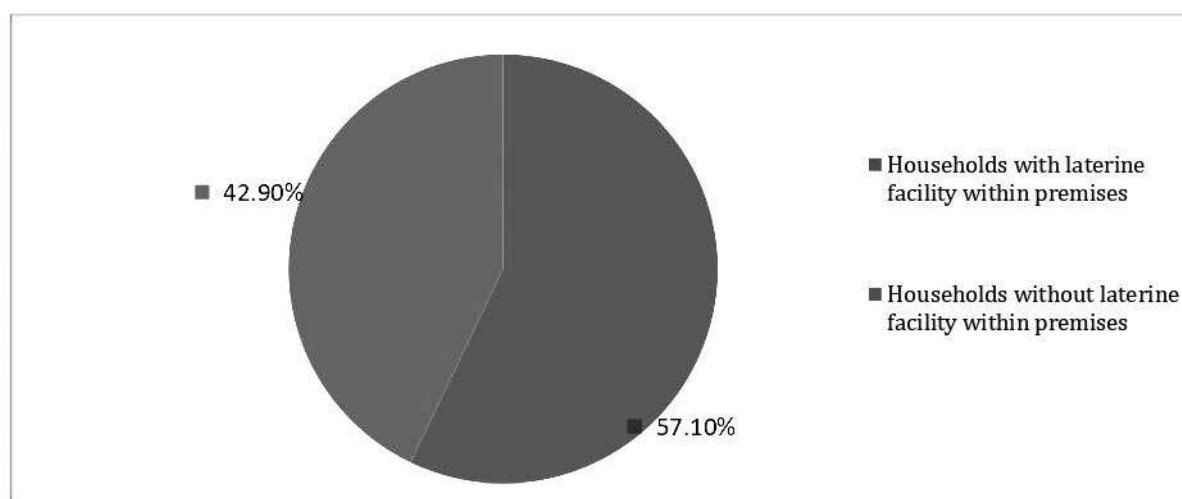
Table 8.1: Households with Latrine Facility in Dhemaji Planning Area, 2011

Type of Latrine Facility		Urban (percent)	Rural (percent)	Planning Area (percent)
Flush system	Piped Sewerage System	11.8	4.1	5.5
Pour flush system	Septic Tank	27.2	4.1	7.7
	Other System	6.9	7.4	7.4
Pit latrine	With slab and ventilated improved pit	21.8	9	11.1
	Without slab and open pit	22.5	23.1	23.1
Service latrine		2	1.6	0.7
Night Soil disposed into open drain		0.1	0.9	0.9
Total		92.3	50.2	57.1

Source: Census of India (2011).

While in the town, maximum percent of households have a septic tank; in the rural areas, households mostly have the pit-latrine system. Figure 8.1 shows the total percent of households with and without a latrine facility in Dhemaji Planning Area.

Figure 8.1: Households with Latrine Facility in Dhemaji Planning Area, 2011



Source: Census of India (2011).

As per Census of India 2011, 7.7 percent of urban households and 49.7 percent of rural households do not have a toilet facility on their premises. Overall, in the Dhemaji Planning Area, 42.9 percent households do not have a toilet of which 2.1 percent make

use of public latrines and 40.8 percent defecate in the open as shown in Error! Reference source not found..

Open defecation can lead to diarrhoea and other water borne diseases linked with consuming and being exposed to human excreta. Near waterways, open defecation can lead to human excreta being carried into the water system without any treatment. As a result, the contaminated water ends up in the main water sources. When people use this water for drinking and cooking, it results in waterborne diseases such as cholera, typhoid, and trachoma.

Figure 8.2: Households without Latrine Facility in Dhemaji Planning Area, 2011

Alternative Source	Urban (percent)	Rural (percent)	Planning Area (percent)
Public latrine	0.7	2.4	2.1
Open defecation	7	47.3	40.8
Total	7.7	49.7	42.9

Source: Census of India (2011).

8.3 Households with Bathrooms

Bathrooms indicate the presence of a bathing facility in the house premises. Error! Reference source not found. depicts that 25.9 percent households in the urban area and 69.1 percent households in rural areas do not have a bathroom as per Census of India 2011. Overall, in the Dhemaji Planning Area, 19.5 percent households have a bathroom, 18.4 percent households have a bathing facility without a roof and 62.1 percent households do not have a bathing facility at all.

Figure 8.3: Households with Bathing facility in Dhemaji Planning Area, 2011

Type of facility	Urban (percent)	Rural (percent)	Planning Area (percent)
Bathroom	54.5	12.8	19.5
Enclosure without roof	19.6	18.1	18.4
No bathing facility within premises	25.9	69.1	62.1

Source: Census of India (2011).

In the absence of a bathing facility, people usually take bath in nearby ponds or lakes in rural areas, while in the urban area, they are dependent on public water sources for bathing.

8.4 Disposal of Wastewater

Wastewater refers to used water from domestic, commercial or industrial activities. Domestic wastewater originates from activities such as restroom usage, bathing, food preparation and washing of clothes, commercial wastewater from non-domestic sources, such as beauty salons or auto body repair shops, etc. This wastewater may contain hazardous materials and requires special treatment or disposal. Industrial wastewater originates from industrial or commercial manufacturing establishments, such as agricultural processing or rice mills.

However, in the Dhemaji Planning Area, since the sewerage system does not exist, it is necessary that the wastewater outlet at the household level is connected to the sewerage system, and the wastewater is not let out in the open where it may become a breeding ground for diseases.

Error! Reference source not found. shows the percent of households with wastewater outlet connected to drainage system in the Dhemaji Planning Area and the numbers are alarming. In the urban area, 81.1 percent households, the wastewater outlet is not connected to the drainage system and for rural areas, this holds true for 94.3 percent households. This means that most of the households drain out wastewater either in nearby water bodies or directly in the open which presents a serious health risk.

Figure 8.4: Households with Wastewater Outlet connected to Drainage in Dhemaji Planning Area, 2011

Wastewater outlet connected to	Urban (percent)	Rural (percent)	Planning Area (percent)
Closed drainage	2.9	1.8	2.0
Open drainage	16.0	3.9	5.9
No drainage	81.1	94.3	92.1

Source: Census of India (2011).

8.5 Swachh Bharat Mission

In 2014, Swachh Bharat Mission was launched throughout the country with the aim to achieve the vision of a 'Clean India'. The goal of the mission was to make urban India free from open defecation and achieve 100 percent scientific management of municipal solid wastes in the 4,041 statutory towns of the country. In rural areas, the Mission sought to eliminate open defecation by improving access to sanitation and increasing awareness to motivate communities to adopt sustainable sanitation practices. The focus of the strategy was to move towards a 'Swachh Bharat' by providing flexibility to state governments, as sanitation is a state subject, to decide on their implementation policy and mechanisms by considering state specific requirements. In Assam, the Swachh Bharat Mission was launched effectively with the slogan of 'Open Defecation Free Assam', and emphasis was placed on community participation as one of the core activities for promoting this programme.

Under this mission, Individual Household Latrines (IHHL) were constructed in villages to provide access to sanitation to all in order to make these villages open defecation free. The number of households covered year wise under the IHHL scheme of Swachh Bharat Mission in different Gram Panchayats falling within the Dhemaji Planning Area is shown in **Table 8.2**.

Table 8.2: Number of Households Covered under Swachh Bharat Mission in Dhemaji Planning Area

Name of Gram Panchayat	Number of Households					
	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Aradhal	74	269	213	239	210	1,005
Bishnupur	48	261	533	595	508	1,945
Gohain Goan	134	102	552	319	451	1,558
Hatigarh	30	85	117	155	421	808
Jiadhal	109	246	284	158	220	1,017
Khubaliya	17	48	80	93	726	964
Moridhal	34	74	549	217	425	1,299
Total	446	1,085	2,328	1,776	2,961	8,596

Source: Swachh Bharat Mission - Gramin, Assam (2021).

8.6 Conclusions

Access to basic sanitation is a critical concern in the Dhemaji Planning Area. Due to the absence of sewerage system at the town level, most households have installed private latrines in the form of flush or pit latrines in their homes. According to Census of India 2011, 7.7 percent of urban households and 49.7 percent of rural households do not have a latrine. Also, 92.1 percent of households discharge wastewater in the open, posing a major health risk.

Individual household latrines were built in villages under the Swachh Bharat Mission to give access to sanitation and eliminate open defecation. However, during the primary survey we found that some families in rural areas believe that a pucca latrine might dirty their environment. Such beliefs are reflective of the economic and cultural reasons that explain the prevalence of open defecation in Dhemaji. Many households in rural areas are economically poor and have kuccha latrines or temporary toilets that get washed away during the flood season. Although sanitation coverage under the Swachh Bharat Mission in Dhemaji is noteworthy but until effective steps are uniformly implemented in the planning area, it would be difficult to curtail the menace of open defecation.

CHAPTER 9: SOCIAL INFRASTRUCTURE

9.1 Introduction

Infrastructure can broadly be defined as long-term physical assets which operate in the market with high barriers to entry and enable the provision of goods and services. Social infrastructure is a subset of the infrastructure sector and typically includes assets that accommodate social services. Examples of social infrastructural assets include schools, universities, hospitals, temples, prisons, community centres, etc. which play an important role in the economic and social development of a city. These assets improve the quality of life of the residents by pushing economic growth through the provision of basic services and facilities which are necessary for businesses to flourish. So, the social infrastructural profile of an urban area can be described in terms of its education, health, recreation and socio-cultural amenities which serve as the core elements of social change and help in accelerating the process of urban development and human wellbeing.

9.2 Education

Education amenities increase the accessibility of people to modern and scientific ideas and technology, help in creating awareness of the available opportunities and facilitate labour mobility. Schools and colleges help people to gain knowledge and skills which would enable them to keep pace with the rapidly changing society and the latest technological advancements. Investment in the education sector lays a strong foundation for human capital which facilitates future inventions and innovations. The availability of educated labour force in a city makes it well adapted to face and resolve future challenges. Education is located at the heart of human flourishing and urban development.

9.2.1 Existing Education Facilities

Basic and advanced educational facilities could be classified into different categories as stated below.

- Schools providing education up to Class V are classified as primary schools.

- Schools providing education up to Class X are classified as secondary schools.
- Schools providing education up to Class XII are classified as senior secondary schools.
- Educational institutes providing a graduate or post-graduate degree in any discipline are classified as colleges.

The type and number of educational facilities falling within the Dhemaji Planning Area are shown in Table 9.1 and Table 9.2. It can be seen that there are a total of 28 schools and colleges in Dhemaji town which include 17 primary schools, 4 secondary schools, 2 senior secondary schools and 5 colleges.

Table 9.1: Education Facilities in Dhemaji Municipal Area, 2021

Education Facility	Number
Primary schools	17
Secondary schools	4
Senior secondary schools	2
Colleges	5
Total	28

Source: Dhemaji Municipal Board (2021).

Table 9.2: Education Facilities in Dhemaji Villages, 2011

	Village Name	Total Population of Village	Pre Primary School		Primary School		Secondary School		Senior Secondary School	
			Govt.	Private	Govt.	Private	Govt.	Private	Govt.	Private
1	Bokabil	280	0	1	1	0	0	0	1	0
2	Jiadhal Bamuni	1,221	0	1	1	0	1	0	1	0
3	No.5 Tekjuri	2,186	0	0	3	0	0	0	0	0
4	No.2 Tekjuri	429	0	0	1	0	0	0	0	0
5	No.4 Tekjuri	472	0	0	1	1	0	0	0	0
6	Jiadhal Miri Pathar	86	0	0	0	0	0	0	0	0
7	Jamuguri Sonowal	627	0	1	1	0	0	0	0	0
8	Jamuguri Miri	787	0	0	1	0	0	0	0	0
9	Dighali Miri	235	0	0	1	0	0	0	0	0
10	Sabari Kalia	570	0	0	1	1	0	0	0	0
11	No.3 Tekjuri	215	0	0	1	0	0	0	0	0
12	No.1	238	0	0	1	0	0	0	0	0

	Village Name	Total Population of Village	Pre Primary School		Primary School		Secondary School		Senior Secondary School	
			Govt.	Private	Govt.	Private	Govt.	Private	Govt.	Private
	Tekjuri									
13	Jiadhal Tinigharia	445	0	0	1	0	1	0	0	0
14	Nara Bil	1,460	0	0	1	0	0	0	0	0
15	Panitula Block	962	0	0	1	0	0	0	0	0
16	Hechuli Pam	817	0	0	1	0	0	0	0	0
17	Deoribil	-	-	-	-	-	-	-	-	-
18	Taru Bil	296	0	0	1	0	0	0	0	0
19	Hatigarh	1,740	0	0	2	0	1	1	0	0
20	Nalani Pam	421	0	0	1	0	0	0	0	0
21	No.2 Kachoiting	1,025	0	0	1	1	1	0	0	0
22	Jiadhal Dighalgara	1,271	0	0	1	1	1	1	0	0
23	No.2 Gopak Sonowal	676	0	0	1	0	0	0	0	0
24	Gopak	1,131	0	0	1	1	0	0	0	0
25	No.1 Nareng	71	0	0	0	0	0	0	0	0
26	No.2 Nareng	180	0	0	1	0	0	0	0	0
27	Bali Gaon	800	0	0	1	0	0	0	0	0
28	Naharbari	672	0	0	1	1	0	0	0	0
29	Dighalimu kh Miri	466	0	0	1	0	0	0	0	0
30	Dighalimu kh	566	0	0	1	0	0	0	0	0
31	Dighali Pathar	146	1	0	1	0	0	0	0	0
32	Bihdia	177	0	0	1	0	0	0	0	0
33	Tanganap ara	577	0	0	1	0	0	0	0	0
34	No.2 Raichapori Dolopa	421	0	0	1	1	0	0	0	0
35	No.4 Raichapori Dolopa	169	0	0	0	1	0	0	0	0
36	Hahchara	157	0	0	1	0	0	0	0	0
37	Bebejia	516	0	0	1	1	1	0	0	0
38	Gutung	548	0	0	1	0	0	0	0	0
39	No.2 Juktali	150	0	0	0	0	0	0	0	0
40	Maz Gaon	329	0	0	1	1	0	0	0	0

	Village Name	Total Population of Village	Pre Primary School		Primary School		Secondary School		Senior Secondary School	
			Govt.	Private	Govt.	Private	Govt.	Private	Govt.	Private
41	No.1 Raichapori	756	0	0	1	0	0	0	0	0
42	Moridhal Ghat	457	0	0	1	0	1	0	1	0
43	No.2 Khajua	867	0	0	1	0	0	0	0	0
44	No.2 Kathal Guri	1,362	0	0	3	1	0	0	0	0
45	Secha Jan	341	0	0	1	0	0	0	0	0
46	Kakoti Block	334	0	0	1	1	0	1	0	0
47	Juktali	438	0	0	1	0	0	0	0	0
48	Rangajan	164	0	0	1	1	0	1	0	0
49	Bor Gaon	865	0	0	1	0	0	0	0	0
50	Dihingia Block	483	0	0	1	1	0	0	0	0
51	Ghilaguri	229	0	0	0	0	0	0	0	0
52	Garia Jan	663	0	0	1	0	1	0	0	0
53	4-No. Ghilaguri	324	0	0	0	1	0	0	0	0
54	No.1 Khajua	599	0	0	1	1	0	0	0	0
55	Jamuguri	526	0	1	1	1	0	0	0	0
56	Jamuguri Gohain Pam	562	0	0	1	0	0	0	0	0
57	No.1 Gohain Pam	37	0	0	0	0	0	0	0	0
58	No.2 Borachira	411	0	0	1	0	0	1	0	0
59	Bam Gaon	798	0	0	1	0	0	0	0	0
60	No.3 Ghilaguri	205	0	0	1	0	0	0	0	0
61	Gowal	223	0	0	1	0	0	0	0	0
62	No.2 Ghilaguri	264	0	0	1	1	0	0	0	0
63	No.1 Borachira	368	0	0	1	0	0	1	0	0
64	Amguri Jamuguri	102	0	0	1	0	0	0	0	0
65	Chowkham	868	0	0	1	0	0	0	0	0
66	Singari Bil	98	0	0	0	0	0	0	0	0
67	Gohain Bari Chapori	683	0	0	1	0	1	0	0	0
68	No.1 Gohain	1,206	0	0	4	0	0	0	0	0

	Village Name	Total Population of Village	Pre Primary School		Primary School		Secondary School		Senior Secondary School	
			Govt.	Private	Govt.	Private	Govt.	Private	Govt.	Private
69	Bakal	1,193	1	0	1	0	0	0	0	0
70	Pabhamari Pathar	432	0	0	1	0	0	0	0	0
71	Simaluguri	157	0	0	0	0	0	0	0	0
72	Napam	97	0	0	0	0	0	0	0	0
73	Dusutimukh Miri Pathar	1,383	1	0	1	1	1	1	0	0
74	Matikhula	1,304	1	0	1	0	0	0	0	0
75	Kowaphala Habi	733	0	0	1	1	0	0	0	0
76	Telijan Pathar	4	0	0	0	0	0	0	0	0
77	Layangar Jan	115	0	0	0	0	0	0	0	0
78	Moumari	72	0	0	0	0	0	0	0	0
79	Kowaphalamiri	713	0	0	1	0	0	0	0	0
80	Kowaphala	450	0	0	1	0	0	0	0	0
81	Bangalmari Miripathar	-	-	-	-	-	-	-	-	-
82	Teli Jan	-	-	-	-	-	-	-	-	-
Sub-total		45,849	5	5	79	22	10	8	3	0
Total		45,849	10		101		18		3	

Source: Census of India (2011).

Thus, outside the municipal area there are 10 nursery or pre-primary schools, 101 primary schools, 18 secondary schools and 3 senior secondary schools.

9.2.2 URDPFI Guidelines for Education Facilities

Urban and Regional Development Plan Formulation and Implementation (URDPFI) Guidelines, 2014 provide a set of planning norms for social infrastructure. For education facilities, these guidelines recommend that one primary school and one secondary school would be required to serve a population of 5,000, one senior secondary school would serve a population of 7,500 and one college would be required for a population of 1,25,000. When compared with the existing number of education facilities in Dhemaji Planning Area, it could be concluded that primary schools and colleges in Dhemaji town are in surplus while secondary and senior secondary schools are less than the required number as shown in **Table 9.3**.

Table 9.3: Required Number of Education Facilities in Dhemaji Planning Area as per URDPFI Guidelines

Education Facility	Population Served per Unit	Minimum Requirement	Existing Number	Surplus/Deficit
Primary Schools	5,000	29	118	Surplus
Secondary Schools	5,000	29	22	Deficit (7 No.)
Senior Secondary Schools	7,500	19	5	Deficit (14 No.)
Colleges	1,25,000	1	5	Surplus

Source: URDPFI Guidelines (2014).

9.3 Healthcare

Health is an essential requirement for shaping an efficient and active workforce and reducing the production loss caused by worker's illnesses. In Dhemaji, provision of safe and sufficient drinking water supply and proper sanitation is still a challenge. The associated health risks make it all the more important to ensure that a safe and sound healthcare system is put in place for the residents.

9.3.1 Existing Healthcare Facilities

Healthcare facilities can be classified into different categories as stated below.

- **Hospital:** A hospital is an institution, where sick or injured are given medical or surgical care. The bed strength ranges from 31 to 500.
- **Primary Health Centres (PHCs):** A Primary Health Centre is the first contact point between a village community and the government medical officer. A PHC covers a population of 30,000 in plain areas with 4-6 indoor or observation beds.
- **Nursing Home:** A nursing home is a long-term care facility licensed by the state that offers 24-hour room and board and health care services including basic and skilled nursing care, rehabilitation and a full range of other therapies, treatments and programs to old and sick people. The difference between a hospital and a nursing home is that a nursing home gives importance to convalescence from a disease while a hospital gives medical treatment for the disease.
- **Pharmacy:** A shop which has the license to sell drugs and medicines of any system is considered as a pharmacy or a medicine shop.

The type and number of healthcare facilities falling within the Dhemaji Planning Area are shown in Table 9.4 and Table 9.5. Dhemaji Civil Hospital located in Bhehpara

Napam, is the main medical hospital serving the entire town. Apart from this, BCB Care and Mili are the two nursing homes located within the core city.

Table 9.4: Healthcare Facilities in Dhemaji Municipal Area, 2021

Medical Facility	Number
General hospital	1
Primary health centre	1
Nursing home	2
Pharmacy	29

Source: Dhemaji Municipal Board (2021).

Table 9.5: Healthcare Facilities in Dhemaji Villages, 2021

Sl.No.	Village Name	Total Population of Village	Community Health Centre	Primary Health Centre	Primary Health Sub Centre	Maternity And Child Welfare Centre
1	Bokabil	280	0	1	1	1
2	Jiadhah Bamuni	1,221	0	0	1	0
3	No.5 Tekjuri	2,186	0	0	0	0
4	No.2 Tekjuri	429	0	0	0	0
5	No.4 Tekjuri	472	0	0	0	0
6	Jiadhah Miri Pathar	86	0	0	0	0
7	Jamuguri Sonowal	627	0	0	0	0
8	Jamuguri Miri	787	0	0	0	0
9	Dighali Miri	235	0	0	0	0
10	Sabari Kalia	570	0	0	0	0
11	No.3 Tekjuri	215	0	0	1	0
12	No.1 Tekjuri	238	0	0	0	0
13	Jiadhah Tinigharia	445	0	0	1	0
14	Nara Bil	1,460	0	0	0	0
15	Panitula Block	962	0	0	0	0
16	Hechuli Pam	817	0	0	0	0
17	Deoribil	-	-	-	-	-
18	Taru Bil	296	0	0	0	0
19	Hatigarh	1,740	0	0	1	0
20	Nalani Pam	421	0	0	0	0
21	No.2 Kachaiting	1,025	0	0	0	0
22	Jiadhah Dighalgara	1,271	0	0	0	0
23	No.2 Gopak Sonowal	676	0	0	0	0
24	Gopak	1,131	0	0	0	0
25	No.1 Nareng	71	0	0	0	0

Sl.No.	Village Name	Total Population of Village	Community Health Centre	Primary Health Centre	Primary Health Sub Centre	Maternity And Child Welfare Centre
26	No.2 Nareng	180	0	0	0	0
27	Bali Gaon	800	0	0	0	0
28	Naharbari	672	0	0	0	0
29	Dighalimukh Miri	466	0	0	0	0
30	Dighalimukh	566	0	0	0	0
31	Dighali Pathar	146	0	0	0	0
32	Bihdia	177	0	0	0	0
33	Tanganapara	577	0	0	0	0
34	No.2 Raichapori Dolopa	421	0	0	0	0
35	No.4 Raichapori Dolopa	169	0	0	0	0
36	Hahchara	157	0	0	0	0
37	Bebejia	516	0	0	0	0
38	Gutung	548	0	0	0	0
39	No.2 Juktali	150	0	0	0	0
40	Maz Gaon	329	0	0	0	0
41	No.1 Raichapori	756	0	0	0	0
42	Moridhal Ghat	457	0	0	0	0
43	No.2 Khajua	867	0	0	0	0
44	No.2 Kathal Guri	1,362	0	0	0	0
45	Secha Jan	341	0	0	0	0
46	Kakoti Block	334	0	0	0	0
47	Juktali	438	0	0	0	0
48	Rangajan	164	0	0	0	0
49	Bor Gaon	865	0	0	0	0
50	Dihingia Block	483	0	0	0	0
51	Ghilaguri	229	0	0	0	0
52	Garia Jan	663	0	0	0	0
53	4-No. Ghilaguri	324	0	0	0	0
54	No.1 Khajua	599	0	0	0	0
55	Jamuguri	526	0	0	1	0
56	Jamuguri Gohain Pam	562	0	0	0	0
57	No.1 Gohain Pam	37	0	0	0	0
58	No.2 Borachira	411	0	0	0	0
59	Bam Gaon	798	0	0	0	0
60	No.3 Ghilaguri	205	0	0	0	0
61	Gowal	223	0	0	1	0
62	No.2 Ghilaguri	264	0	0	0	0
63	No.1 Borachira	368	0	0	0	0
64	Amguri Jamuguri	102	0	0	0	0
65	Chowkham	868	0	0	0	0
66	Singari Bil	98	0	0	0	0

Sl. No.	Village Name	Total Population of Village	Community Health Centre	Primary Health Centre	Primary Health Sub Centre	Maternity And Child Welfare Centre
67	Gohain Bari Chapori	683	0	0	1	0
68	No.1 Gohain	1,206	0	0	0	0
69	Bakal	1,193	0	0	0	0
70	Pabhamari Pathar	432	0	0	0	0
71	Simaluguri	157	0	0	0	0
72	Napam	97	0	0	0	0
73	Dusutimukh Miri Pathar	1,383	0	0	0	0
74	Matikhula	1,304	0	0	0	0
75	Kowaphala Habi	733	0	0	0	0
76	Telijan Pathar	4	0	0	0	0
77	Layangar Jan	115	0	0	0	0
78	Moumari	72	0	0	0	0
79	Kowaphalamiri	713	0	0	0	0
80	Kowaphala	450	0	0	0	0
81	Bangalmari Miripathar	-	-	-	-	-
82	Teli Jan	-	-	-	-	-
Total		45,849	0	1	8	1

Source: Census of India (2011).

Thus, outside the planning area there are one primary health centre, 8 primary health sub-centres and 1 maternity and child welfare centre.

9.3.2 URDPFI Guidelines for Healthcare facilities

URDPFI Guidelines recommend that there should be a general hospital for a population of 2.5 lakhs and a nursing home for a population of 45,000. Comparing these with the existing number of healthcare facilities in Dhemaji Planning Area, it can be concluded that one General hospital, that is, Dhemaji Civil Hospital, is enough to serve the planning area's population, as per the guidelines. **Table 9.6** shows that the number of nursing homes is in surplus.

Table 9.6: Required Number of Healthcare Facilities in Dhemaji Planning Area as per URDPFI Guidelines

Healthcare Facility	Population Served per Unit	Minimum Requirement	Existing Number	Surplus and Deficit
General hospital	2,50,000	1	1	-

Nursing home	45,000	3	2	Deficit (1 No.)
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Source: URDPFI Guidelines (2014).

However, during the field survey, residents revealed that the quality of services provided at the Dhemaji Civil Hospital is low. So, at the time of serious illnesses or surgeries, people prefer to go to Dibrugarh or Guwahati for treatment.

Figure 9.1: Dhemaji Civil Hospital, 2021



Source: Primary Survey, SPA Delhi (2021).

9.4 Recreational and Socio-cultural Facilities

Recreational facilities are an integral part of social infrastructure which is an indispensable pillar of the overall development of a city. Recreational amenities often serve as community spaces to bring people together to build meaningful relationships. These include parks, playgrounds, hotels, tourism spots, etc. that help strengthen communities at various levels and also feed into the economic growth of a city. Socio-cultural facilities include community centres and religious facilities which give a space to promote social interactions among individuals, thereby creating a sense of spiritual, physical and intellectual wellbeing.

9.4.1 Recreational and Socio-cultural Facilities

These include public and private buildings or spaces for community entertainment, relaxation, social activity and other leisure needs. Table 9.7 shows the type and number of recreational facilities in Dhemaji Planning Area. Of the 32 hotels and restaurants within the town, majority are located along the main roads, that is, NH15 and Station

Road. There are a total of 4 parks and playgrounds which include the Dhemaji Children's Park, Parade Ground, Sports Stadium and the Dhemaji College Playground.

Table 9.7: Recreational Facilities in Dhemaji Planning Area, 2021

Recreational Facility	Number
Hotels and Restaurants	32
Parks	1
Playgrounds	3
Market Complexes	3
Community Halls	Nil

Source: Dhemaji Municipal Board (2021).

Figure 9.2 depicts the Tennis Club of Dhemaji Sports Stadium which has both indoor as well as outdoor sports facilities. A total of three market complexes, two for daily markets and 1 for weekly market, are also present within the town area.

Figure 9.2: Tennis Club in Dhemaji Sports Stadium



Source: Primary Survey, SPA Delhi (2021).

However, no community centres or community halls have been built in Dhemaji. This is because traditionally, all community gatherings and religious ceremonies in Dhemaji take place in '*Naamghars*'. Women often come together in the evening to offer prayers in these *naamghars* and sing bhajans. It is also noteworthy that one *naamghar* would be usually dedicated to one particular community. **Figure 9.3** depict the outer and inner aesthetics of a *naamghar* for the Mising community in Dhemaji. There is a total of 34 large and small *naamghars* in Dhemaji town with 'Aradhal' being the largest which is located near Pegu Bazaar along NH15. There is one cremation ground and one graveyard within the Dhemaji Municipal limits, and is located along NH15.

Figure 9.3: Naamghar in Dhemaji

Source: Primary Survey, SPA Delhi (2021).

9.4.2 URDPFI Guidelines for Recreational and Socio-cultural Facilities

According to the URDPFI guidelines, a neighbourhood park and a neighbourhood playground for a population of 15,000 each should be provided. Also, there should be a community room for a population of 5,000. On these bases, **Table 9.8** shows that there exists a surplus of playgrounds and a deficit of parks in Dhemaji Municipal Area. Dhemaji Children's Park, which was inaugurated in the year 2009, is the only public park in the town. Considering a *naamghar* to be equivalent to a community room in Dhemaji, we can say that the numbers of naamghars are well above the requirement.

Table 9.8 Required Number of Recreational and Socio-cultural Facilities in Dhemaji Planning Area as per URDPFI guidelines

Facility	Population Served per Unit	Minimum Requirement	Existing Number	Surplus and Deficit
Housing Area Park	5,000	29	0	Deficit (29 No.)
Neighbourhood Park	15,000	10	1	Deficit (9 No.)
Community Park	1,00,000	1	0	Deficit (1 No.)
Community level Multipurpose Ground	1,00,000	1	0	Deficit (1 No.)
Residential Unit Play Area	5,000	29	0	Deficit (29 No.)
Neighbourhood	15,000	10	3	Deficit (7 No.)

Facility	Population Served per Unit	Minimum Requirement	Existing Number	Surplus and Deficit
Playground				
District Sports Centre	1,00,000	1	0	Deficit (1 No.)

Source: URDPFI Guidelines (2014).

9.5 Conclusions

Dhemaji lacks in higher education with deficiency in secondary and senior secondary schools. The town's primary medical institution is Dhemaji Civil Hospital. Apart from this, the town centre has two nursing homes. Although there are not enough healthcare facilities to support the town's population as per projection of 2041 and also the quality of their services is subpar. Majority of hotels and restaurants are located along the main routes, that is, NH15 and Station Road. The recreational facilities in the town, particularly with respect to tourism, have immense scope for development. More number of public parks must be developed where residents can spend their leisure time. Within the town area, there are three market complexes. However, these market facilities lack adequate maintenance and are in a dilapidated state. All communal gatherings and religious ceremonies in Dhemaji are usually held in *Naamghars*.

CHAPTER 10: ENVIRONMENT AND DISASTERS

10.1 Introduction

A master plan aims to improve urban amenities and intends to provide quality life including suitable environmental conditions to urban dwellers, which include good quality of air, water and a rich natural resource base. Hence, by identifying the challenges faced by an area, the development plan must attempt to make the city more habitable and environmentally sustainable. Land management affects the entire environment. It becomes necessary that land be allocated judiciously with due consideration to the natural environment. As cities today face rapid urbanization and urban sprawl, there is a frequent need to reconcile requirements of additional land for important uses such as housing, industry, commerce and retailing, with an intention to simultaneously protect ecologically sensitive areas.

Although urban development of Dhemaji town has been relatively slow, with the town still being devoid of several infrastructural facilities, it is equally important that the demand for urban transformation is not fulfilled by putting its natural environment at risk. The region is flood prone and earthquake prone, with a vast network of rivers, rivulets and *beels*¹². Therefore, Dhemaji Master Plan could emphasize protection of its environmentally sensitive and disaster-prone areas. Apart from this, issues related to water pollution, deforestation and wetland degradation also require careful consideration.

10.2 Environmentally Sensitive Areas

Environmentally sensitive areas are those areas that are highly vulnerable to environmental destruction or damage. These are also known as eco-sensitive areas. Since, these areas or regions might be affected even by mild disturbances, they need careful planning and management.

Dhemaji Planning Area is characterized by the presence of several physical features which make the region highly eco-sensitive. It is bestowed with rich flora and fauna,

¹² A beel is a lake-like wetland with static water as opposed to moving water in rivers and canals.